
Appendix A: Hydrology Calibration and Validation for the Floyds Fork Watershed

Table of Contents

TABLE OF CONTENTS	0
LIST OF FIGURES	1
LIST OF TABLES	4

List of Figures

Figure A-1	Hydrology Calibration and Validation Stations Utilized in the Floyds Fork Watershed Model.....	6
Figure A-2.	Mean daily flow: Model Outlet 615 vs. USGS 03297900 FLOYDS FORK NEAR PEWEE VALLEY, KY	7
Figure A-3.	Mean monthly flow: Model Outlet 615 vs. USGS 03297900 FLOYDS FORK NEAR PEWEE VALLEY, KY	7
Figure A-4.	Monthly flow regression and temporal variation: Model Outlet 615 vs. USGS 03297900 FLOYDS FORK NEAR PEWEE VALLEY, KY	8
Figure A-5.	Seasonal regression and temporal aggregate: Model Outlet 615 vs. USGS 03297900 FLOYDS FORK NEAR PEWEE VALLEY, KY	8
Figure A-6.	Seasonal medians and ranges: Model Outlet 615 vs. USGS 03297900 FLOYDS FORK NEAR PEWEE VALLEY, KY.....	9
Figure A-7.	Flow exceedence: Model Outlet 615 vs. USGS 03297900 FLOYDS FORK NEAR PEWEE VALLEY, KY	10
Figure A-8.	Flow accumulation: Model Outlet 615 vs. USGS 03297900 FLOYDS FORK NEAR PEWEE VALLEY, KY	10
Figure A-9.	Mean daily flow: Model Outlet 180 vs. USGS 03298000 FLOYDS FORK AT FISHERVILLE, KY	12
Figure A-10.	Mean monthly flow: Model Outlet 180 vs. USGS 03298000 FLOYDS FORK AT FISHERVILLE, KY	12
Figure A-11.	Monthly flow regression and temporal variation: Model Outlet 180 vs. USGS 03298000 FLOYDS FORK AT FISHERVILLE, KY	13
Figure A-12.	Seasonal regression and temporal aggregate: Model Outlet 180 vs. USGS 03298000 FLOYDS FORK AT FISHERVILLE, KY	13
Figure A-13.	Seasonal medians and ranges: Model Outlet 180 vs. USGS 03298000 FLOYDS FORK AT FISHERVILLE, KY	14
Figure A-14.	Flow exceedence: Model Outlet 180 vs. USGS 03298000 FLOYDS FORK AT FISHERVILLE, KY	15
Figure A-15.	Flow accumulation: Model Outlet 180 vs. USGS 03298000 FLOYDS FORK AT FISHERVILLE, KY	15
Figure A-16.	Mean daily flow: Model Outlet 167 vs. USGS 03298135 CHENOWETH RUN AT RUCKRIEGAL PARKWAY, KY.....	17
Figure A-17.	Mean monthly flow: Model Outlet 167 vs. USGS 03298135 CHENOWETH RUN AT RUCKRIEGAL PARKWAY, KY.....	17
Figure A-18.	Monthly flow regression and temporal variation: Model Outlet 167 vs. USGS 03298135 CHENOWETH RUN AT RUCKRIEGAL PARKWAY, KY	18
Figure A-19.	Seasonal regression and temporal aggregate: Model Outlet 167 vs. USGS 03298135 CHENOWETH RUN AT RUCKRIEGAL PARKWAY, KY	18
Figure A-20.	Seasonal medians and ranges: Model Outlet 167 vs. USGS 03298135 CHENOWETH RUN AT RUCKRIEGAL PARKWAY, KY	19
Figure A-21.	Flow exceedence: Model Outlet 167 vs. USGS 03298135 CHENOWETH RUN AT RUCKRIEGAL PARKWAY, KY.....	20
Figure A-22.	Flow accumulation: Model Outlet 167 vs. USGS 03298135 CHENOWETH RUN AT RUCKRIEGAL PARKWAY, KY.....	20
Figure A-23.	Mean daily flow: Model Outlet 606 vs. USGS 03298200 FLOYDS FORK NEAR MT WASHINGTON, KY.....	22
Figure A-24.	Mean monthly flow: Model Outlet 606 vs. USGS 03298200 FLOYDS FORK NEAR MT WASHINGTON, KY.....	22

Figure A-25.	Monthly flow regression and temporal variation: Model Outlet 606 vs. USGS 03298200 FLOYDS FORK NEAR MT WASHINGTON, KY.....	23
Figure A-26.	Seasonal regression and temporal aggregate: Model Outlet 606 vs. USGS 03298200 FLOYDS FORK NEAR MT WASHINGTON, KY.....	23
Figure A-27.	Seasonal medians and ranges: Model Outlet 606 vs. USGS 03298200 FLOYDS FORK NEAR MT WASHINGTON, KY.....	24
Figure A-28.	Flow exceedence: Model Outlet 606 vs. USGS 03298200 FLOYDS FORK NEAR MT WASHINGTON, KY.....	25
Figure A-29.	Flow accumulation: Model Outlet 606 vs. USGS 03298200 FLOYDS FORK NEAR MT WASHINGTON, KY.....	25
Figure A-30.	Mean daily flow: Model Outlet 130 vs. USGS 03298300 PENNSLYVANIA RUN AT MT WASHINGTON RD NR LOUISVILLE.....	27
Figure A-31.	Mean monthly flow: Model Outlet 130 vs. USGS 03298300 PENNSLYVANIA RUN AT MT WASHINGTON RD NR LOUISVILLE.....	27
Figure A-32.	Monthly flow regression and temporal variation: Model Outlet 130 vs. USGS 03298300 PENNSLYVANIA RUN AT MT WASHINGTON RD NR LOUISVILLE.....	28
Figure A-33.	Seasonal regression and temporal aggregate: Model Outlet 130 vs. USGS 03298300 PENNSLYVANIA RUN AT MT WASHINGTON RD NR LOUISVILLE.....	28
Figure A-34.	Seasonal medians and ranges: Model Outlet 130 vs. USGS 03298300 PENNSLYVANIA RUN AT MT WASHINGTON RD NR LOUISVILLE.....	29
Figure A-35.	Flow exceedence: Model Outlet 130 vs. USGS 03298300 PENNSLYVANIA RUN AT MT WASHINGTON RD NR LOUISVILLE.....	30
Figure A-36.	Flow accumulation: Model Outlet 130 vs. USGS 03298300 PENNSLYVANIA RUN AT MT WASHINGTON RD NR LOUISVILLE.....	30
Figure A-37.	Mean daily flow: Model Outlet 609 vs. USGS 03298150 CHENOWETH RUN AT GELHAUS LANE NEAR FERN CREEK, KY.....	32
Figure A-38.	Mean monthly flow: Model Outlet 609 vs. USGS 03298150 CHENOWETH RUN AT GELHAUS LANE NEAR FERN CREEK, KY.....	32
Figure A-39.	Monthly flow regression and temporal variation: Model Outlet 609 vs. USGS 03298150 CHENOWETH RUN AT GELHAUS LANE NEAR FERN CREEK, KY.....	33
Figure A-40.	Seasonal regression and temporal aggregate: Model Outlet 609 vs. USGS 03298150 CHENOWETH RUN AT GELHAUS LANE NEAR FERN CREEK, KY.....	33
Figure A-41.	Seasonal medians and ranges: Model Outlet 609 vs. USGS 03298150 CHENOWETH RUN AT GELHAUS LANE NEAR FERN CREEK, KY.....	34
Figure A-42.	Flow exceedence: Model Outlet 609 vs. USGS 03298150 CHENOWETH RUN AT GELHAUS LANE NEAR FERN CREEK, KY.....	35
Figure A-43.	Flow accumulation: Model Outlet 609 vs. USGS 03298150 CHENOWETH RUN AT GELHAUS LANE NEAR FERN CREEK, KY.....	35
Figure A-44.	Mean daily flow: Model Outlet 134 vs. USGS 03298250 CEDAR CREEK AT THIXTON ROAD NEAR LOUISVILLE, KY.....	37
Figure A-45.	Mean monthly flow: Model Outlet 134 vs. USGS 03298250 CEDAR CREEK AT THIXTON ROAD NEAR LOUISVILLE, KY.....	37
Figure A-46.	Monthly flow regression and temporal variation: Model Outlet 134 vs. USGS 03298250 CEDAR CREEK AT THIXTON ROAD NEAR LOUISVILLE, KY.....	38
Figure A-47.	Seasonal regression and temporal aggregate: Model Outlet 134 vs. USGS 03298250 CEDAR CREEK AT THIXTON ROAD NEAR LOUISVILLE, KY.....	38
Figure A-48.	Seasonal medians and ranges: Model Outlet 134 vs. USGS 03298250 CEDAR CREEK AT THIXTON ROAD NEAR LOUISVILLE, KY.....	39
Figure A-49.	Flow exceedence: Model Outlet 134 vs. USGS 03298250 CEDAR CREEK AT THIXTON ROAD NEAR LOUISVILLE, KY.....	40

Figure A-50.	Flow accumulation: Model Outlet 134 vs. USGS 03298250 CEDAR CREEK AT THIXTON ROAD NEAR LOUISVILLE, KY.....	40
Figure A-51.	Mean daily flow: Model Outlet 134 vs. USGS 03298250 CEDAR CREEK AT THIXTON ROAD NEAR LOUISVILLE, KY.....	42
Figure A-52.	Mean monthly flow: Model Outlet 134 vs. USGS 03298250 CEDAR CREEK AT THIXTON ROAD NEAR LOUISVILLE, KY.....	42
Figure A-53.	Monthly flow regression and temporal variation: Model Outlet 134 vs. USGS 03298250 CEDAR CREEK AT THIXTON ROAD NEAR LOUISVILLE, KY.....	43
Figure A-54.	Seasonal regression and temporal aggregate: Model Outlet 134 vs. USGS 03298250 CEDAR CREEK AT THIXTON ROAD NEAR LOUISVILLE, KY.....	43
Figure A-55.	Seasonal medians and ranges: Model Outlet 134 vs. USGS 03298250 CEDAR CREEK AT THIXTON ROAD NEAR LOUISVILLE, KY.....	44
Figure A-56.	Flow exceedence: Model Outlet 134 vs. USGS 03298250 CEDAR CREEK AT THIXTON ROAD NEAR LOUISVILLE, KY.....	45
Figure A-57.	Flow accumulation: Model Outlet 134 vs. USGS 03298250 CEDAR CREEK AT THIXTON ROAD NEAR LOUISVILLE, KY.....	45
Figure A-58.	Qualitative and Quantitative scores for the Hydrology Calibration and Validation stations in the Floyds Fork Watershed model.....	48

List of Tables

Table A-1	Hydrology Calibration and Validation Stations Utilized for the Floyds Fork Watershed Model	5
Table A-2.	Seasonal summary: Model Outlet 615 vs. USGS 03297900 FLOYDS FORK NEAR PEWEE VALLEY, KY	9
Table A-3.	Summary statistics: Model Outlet 615 vs. USGS 03297900 FLOYDS FORK NEAR PEWEE VALLEY, KY	11
Table A-4.	Seasonal summary: Model Outlet 180 vs. USGS 03298000 FLOYDS FORK AT FISHERVILLE, KY	14
Table A-5.	Summary statistics: Model Outlet 180 vs. USGS 03298000 FLOYDS FORK AT FISHERVILLE, KY	16
Table A-6.	Seasonal summary: Model Outlet 167 vs. USGS 03298135 CHENOWETH RUN AT RUCKRIEGAL PARKWAY, KY	19
Table A-7.	Summary statistics: Model Outlet 167 vs. USGS 03298135 CHENOWETH RUN AT RUCKRIEGAL PARKWAY, KY	21
Table A-8.	Seasonal summary: Model Outlet 606 vs. USGS 03298200 FLOYDS FORK NEAR MT WASHINGTON, KY	24
Table A-9.	Summary statistics: Model Outlet 606 vs. USGS 03298200 FLOYDS FORK NEAR MT WASHINGTON, KY	26
Table A-10.	Seasonal summary: Model Outlet 130 vs. USGS 03298300 PENNSLYVANIA RUN AT MT WASHINGTON RD NR LOUISVILLE	29
Table A-11.	Summary statistics: Model Outlet 130 vs. USGS 03298300 PENNSLYVANIA RUN AT MT WASHINGTON RD NR LOUISVILLE	31
Table A-12.	Seasonal summary: Model Outlet 609 vs. USGS 03298150 CHENOWETH RUN AT GELHAUS LANE NEAR FERN CREEK, KY	34
Table A-13.	Summary statistics: Model Outlet 609 vs. USGS 03298150 CHENOWETH RUN AT GELHAUS LANE NEAR FERN CREEK, KY	36
Table A-14.	Seasonal summary: Model Outlet 134 vs. USGS 03298250 CEDAR CREEK AT THIXTON ROAD NEAR LOUISVILLE, KY	39
Table A-15.	Summary statistics: Model Outlet 134 vs. USGS 03298250 CEDAR CREEK AT THIXTON ROAD NEAR LOUISVILLE, KY	41
Table A-16.	Seasonal summary: Model Outlet 134 vs. USGS 03298250 CEDAR CREEK AT THIXTON ROAD NEAR LOUISVILLE, KY	44
Table A-17.	Summary statistics: Model Outlet 134 vs. USGS 03298250 CEDAR CREEK AT THIXTON ROAD NEAR LOUISVILLE, KY	46
Table A-18.	Summary: Qualitative and Quantitative scores for the Hydrology Calibration and Validation stations	47

Table A-1 Hydrology Calibration and Validation Stations Utilized for the Floyds Fork Watershed Model

Location: Main Stem: Floyds Fork							
USGS Gage ID	Site Name	USGS Drainage Area (mi ²)	USGS Drainage Area (acres)	LSPC Sub-Watershed	LSPC Drainage Area (acres)	Type	Period of Record Utilized
03297900	Floyds Fork near Peewee Valley	80	51136	615	53084	Calibration	1/1/2001-12/31/2010
03298000	Floyds Fork at Fisherville	138	88320	180	88803	Calibration	1/1/2001-12/31/2010
03298200	Floyds Fork near Mt. Washington	213	136320	606	137052	Calibration	1/1/2001-11/30/2010
Location: Tributaries							
03298135	Chenoweth Run at Ruckriegal Parkway	5	3501	167	3449	Calibration	1/1/2001-11/30/2010
03298150	Chenoweth Run at Gelhaus Lane	12	7424	609	8176	Validation	1/1/2001-12/31/2010
03298250	Cedar Creek at Thixton Road	11	7104	134	7212	Validation	1/1/2001-9/30/2002, 10/1/2005-12/31/2010
03298300	Pennsylvania Run at Mt. Washington	6	4096	130	4182	Calibration	1/1/2001-11/30/2010

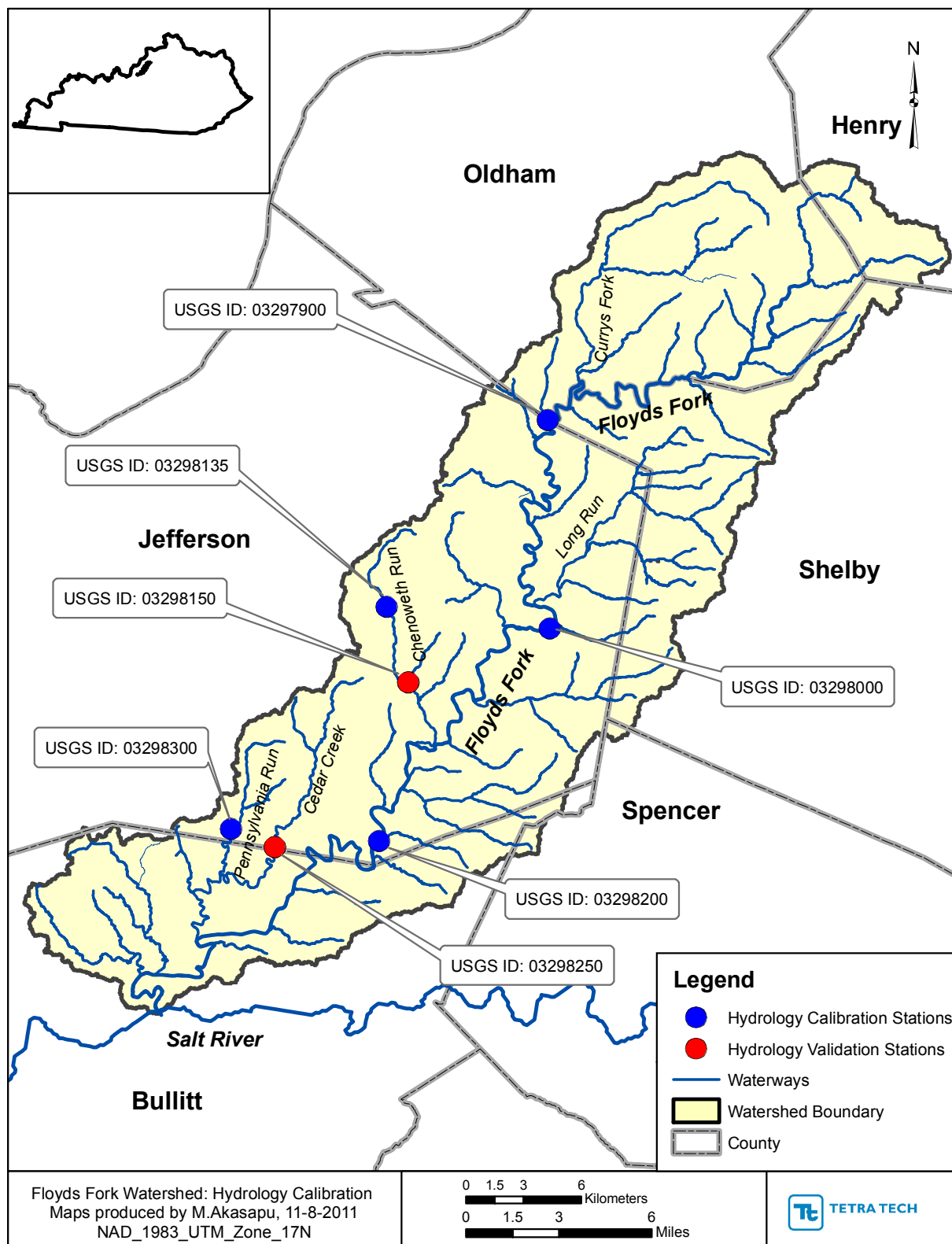


Figure A-1 Hydrology Calibration and Validation Stations Utilized in the Floyds Fork Watershed Model

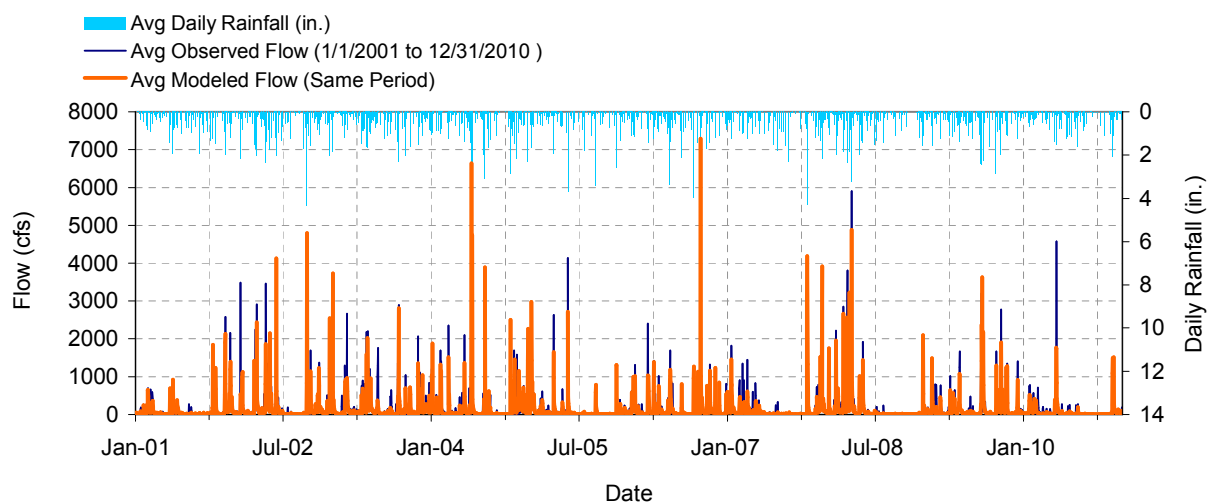


Figure A-2. Mean daily flow: Model Outlet 615 vs. USGS 03297900 FLOYDS FORK NEAR PEWEE VALLEY, KY

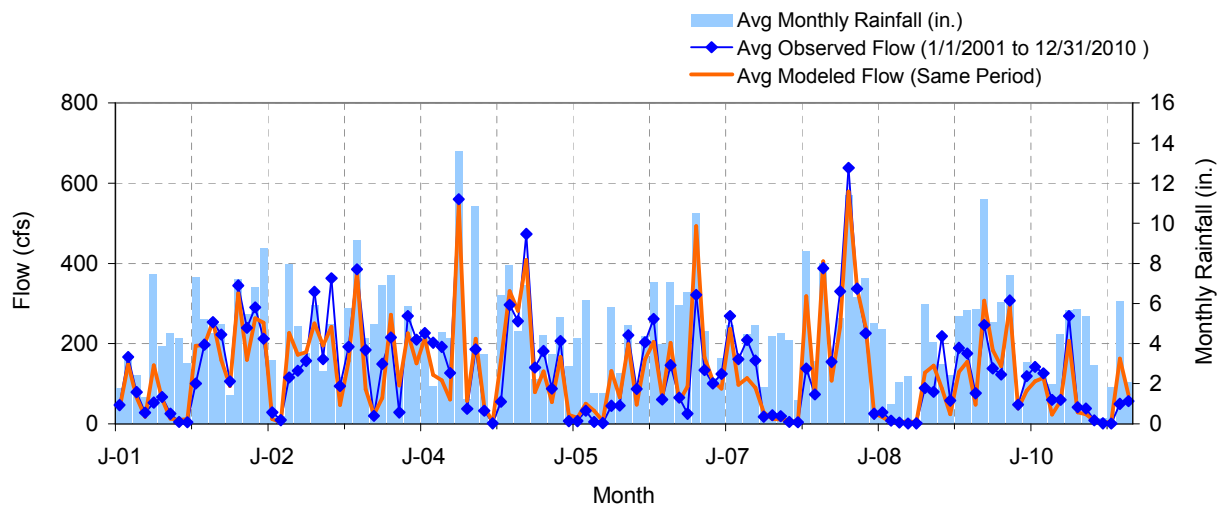


Figure A-3. Mean monthly flow: Model Outlet 615 vs. USGS 03297900 FLOYDS FORK NEAR PEWEE VALLEY, KY

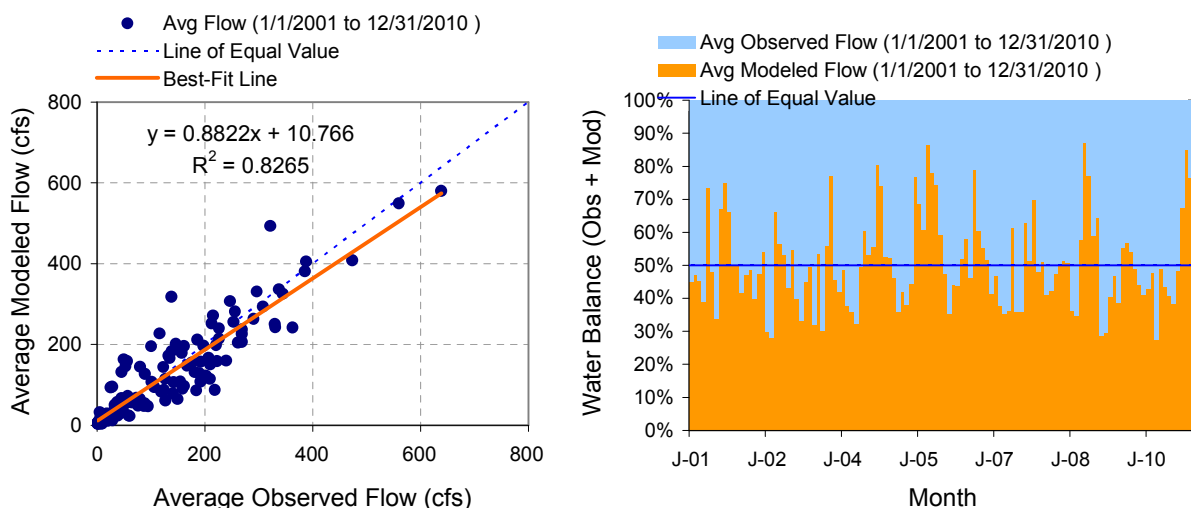


Figure A-4. Monthly flow regression and temporal variation: Model Outlet 615 vs. USGS 03297900 FLOYDS FORK NEAR PEWEE VALLEY, KY

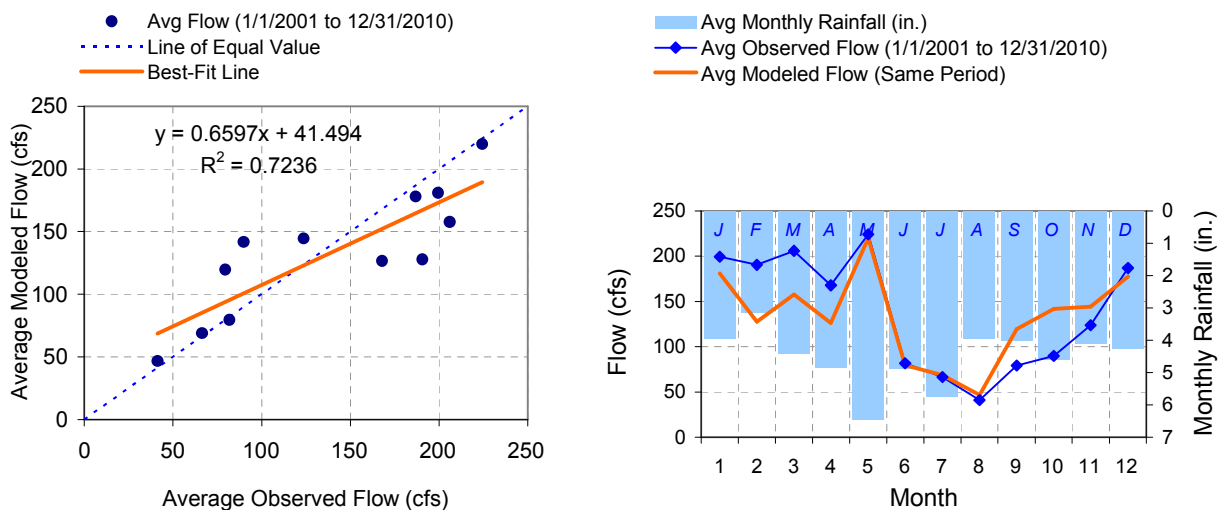


Figure A-5. Seasonal regression and temporal aggregate: Model Outlet 615 vs. USGS 03297900 FLOYDS FORK NEAR PEWEE VALLEY, KY

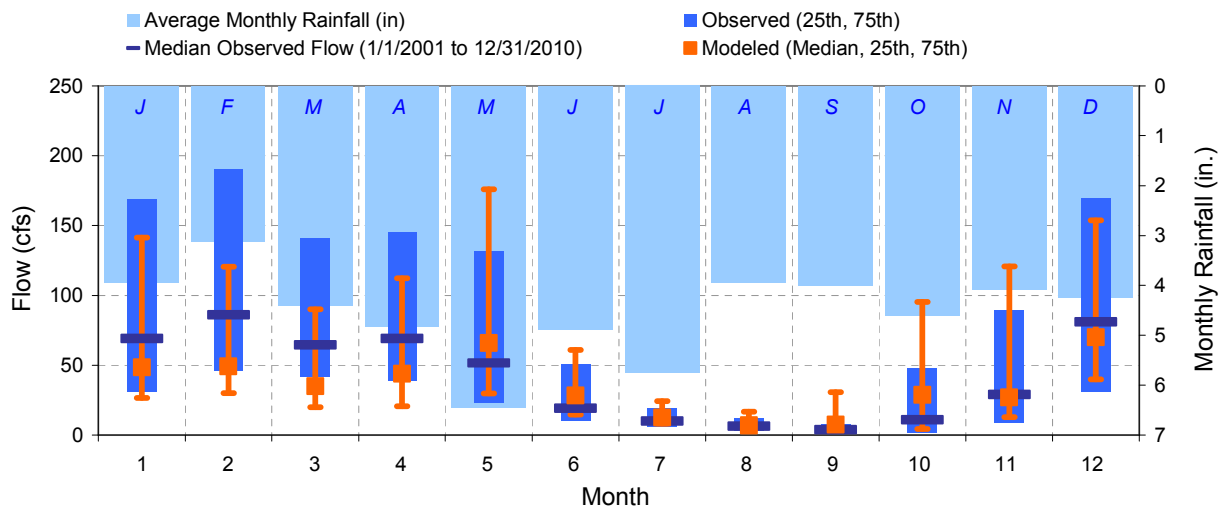


Figure A-6. Seasonal medians and ranges: Model Outlet 615 vs. USGS 03297900 FLOYDS FORK NEAR PEWEE VALLEY, KY

Table A-2. Seasonal summary: Model Outlet 615 vs. USGS 03297900 FLOYDS FORK NEAR PEWEE VALLEY, KY

MONTH	OBSERVED FLOW (CFS)				MODELED FLOW (CFS)			
	MEAN	MEDIAN	25TH	75TH	MEAN	MEDIAN	25TH	75TH
Jan	199.48	69.00	31.25	169.00	180.92	48.55	26.71	141.35
Feb	190.56	86.00	46.00	190.75	127.75	49.14	30.05	120.54
Mar	206.05	64.50	42.00	141.50	157.73	34.92	19.92	90.08
Apr	167.95	69.00	39.00	145.50	126.62	43.80	20.67	112.34
May	224.34	51.50	23.00	131.50	219.97	65.85	29.80	175.86
Jun	81.77	19.00	9.90	50.75	79.56	28.26	14.59	60.84
Jul	66.43	10.00	5.70	18.75	68.80	12.56	8.27	24.10
Aug	41.30	6.30	2.73	11.75	46.65	6.89	3.94	16.53
Sep	79.39	3.90	2.10	8.03	119.65	7.46	3.15	30.66
Oct	89.91	11.00	1.60	48.00	141.65	28.71	4.35	95.42
Nov	123.70	29.00	8.40	89.25	144.42	26.81	12.93	120.80
Dec	186.90	81.00	31.00	169.75	177.88	70.04	39.88	153.86

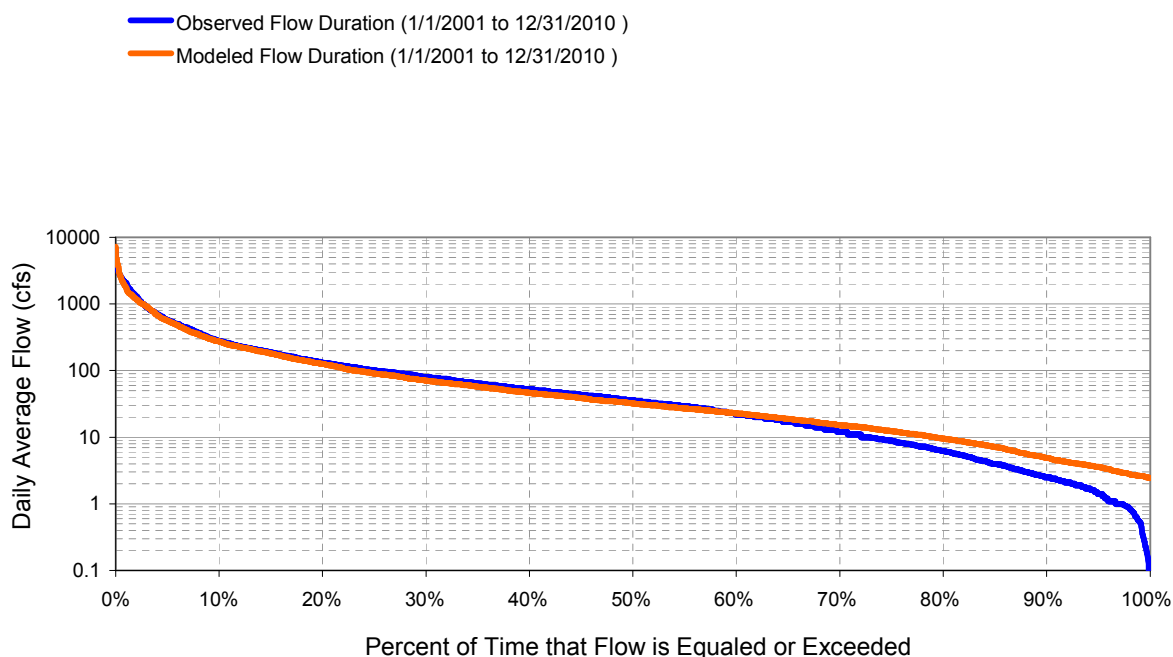


Figure A-7. Flow exceedence: Model Outlet 615 vs. USGS 03297900 FLOYDS FORK NEAR PEWEE VALLEY, KY

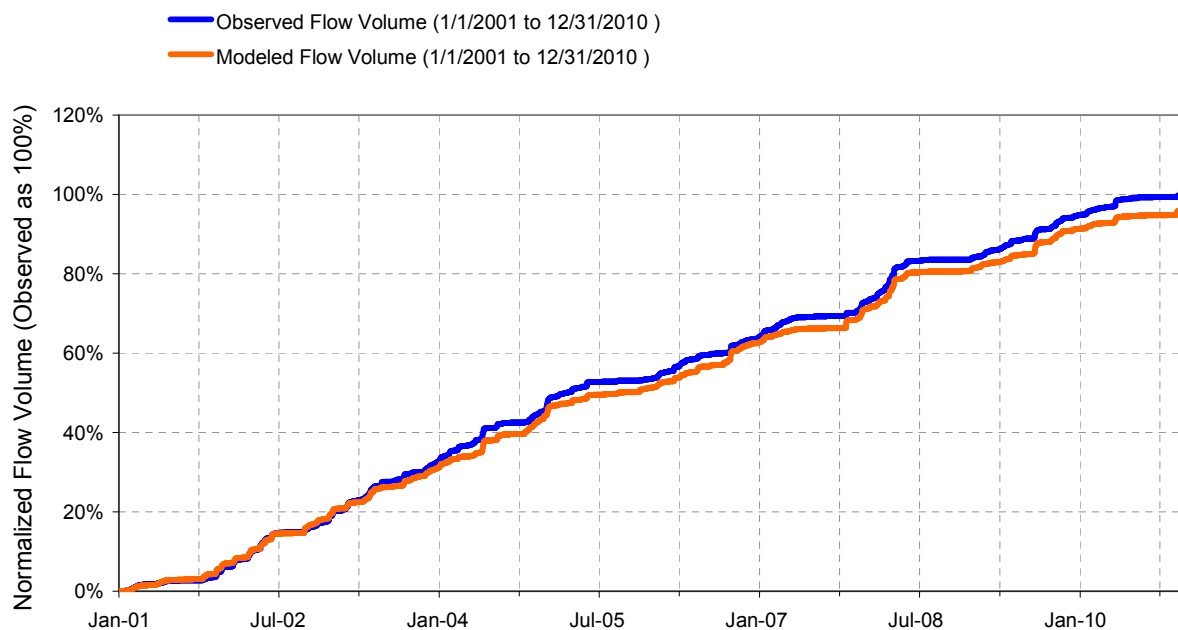


Figure A-8. Flow accumulation: Model Outlet 615 vs. USGS 03297900 FLOYDS FORK NEAR PEWEE VALLEY, KY

Table A-3. Summary statistics: Model Outlet 615 vs. USGS 03297900 FLOYDS FORK NEAR PEWEE VALLEY, KY

LSPC Simulated Flow		Observed Flow Gage	
REACH OUTFLOW FROM SUBBASIN 615 10-Year Analysis Period: 1/1/2001 - 12/31/2010 Flow volumes are (inches/year) for upstream drainage area		USGS 03297900 FLOYDS FORK NEAR PEWEE VALLEY, KY Hydrologic Unit Code: 5140102 Latitude: 38.28534776 Longitude: -85.4674592 Drainage Area (sq-mi): 79.9	
Total Simulated In-stream Flow:	22.58	Total Observed In-stream Flow:	23.46
Total of simulated highest 10% flows:	15.02	Total of Observed highest 10% flows:	15.56
Total of Simulated lowest 50% flows:	1.18	Total of Observed Lowest 50% flows:	1.03
Simulated Summer Flow Volume (months 7-9):	3.34	Observed Summer Flow Volume (7-9):	2.66
Simulated Fall Flow Volume (months 10-12):	6.63	Observed Fall Flow Volume (10-12):	5.72
Simulated Winter Flow Volume (months 1-3):	6.56	Observed Winter Flow Volume (1-3):	8.35
Simulated Spring Flow Volume (months 4-6):	6.05	Observed Spring Flow Volume (4-6):	6.72
Total Simulated Storm Volume:	14.91	Total Observed Storm Volume:	15.94
Simulated Summer Storm Volume (7-9):	2.35	Observed Summer Storm Volume (7-9):	2.18
<i>Errors (Simulated-Observed)</i>	<i>Error Statistics</i>	<i>Recommended Criteria</i>	
Error in total volume:	-3.76	10	
Error in 50% lowest flows:	14.39	10	
Error in 10% highest flows:	-3.43	15	
Seasonal volume error - Summer:	25.30	30	
Seasonal volume error - Fall:	15.83	30	
Seasonal volume error - Winter:	-21.42	30	
Seasonal volume error - Spring:	-9.98	30	
Error in storm volumes:	-6.47	20	
Error in summer storm volumes:	8.18	50	
Nash-Sutcliffe Coefficient of Efficiency, E:	0.620	Model accuracy increases as E or E' approaches 1.0	
Baseline adjusted coefficient (Garrick), E':	0.544		

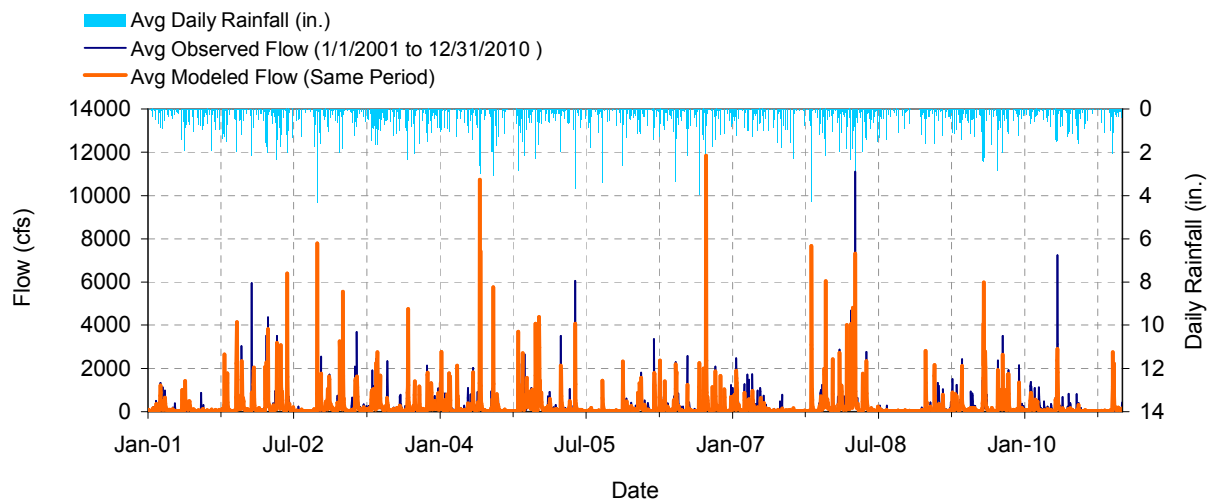


Figure A-9. Mean daily flow: Model Outlet 180 vs. USGS 03298000 FLOYDS FORK AT FISHERVILLE, KY

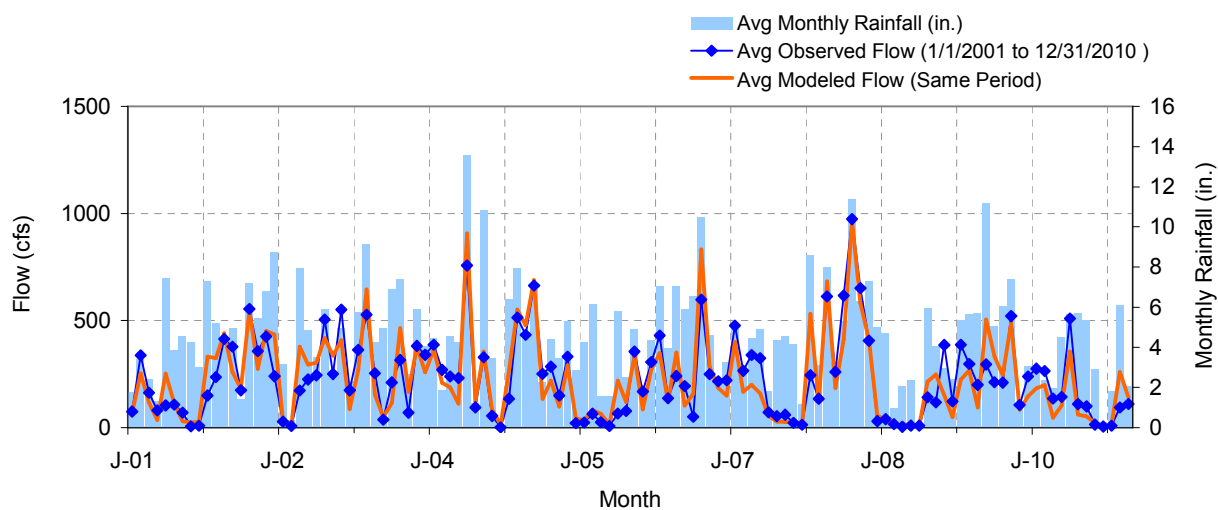


Figure A-10. Mean monthly flow: Model Outlet 180 vs. USGS 03298000 FLOYDS FORK AT FISHERVILLE, KY

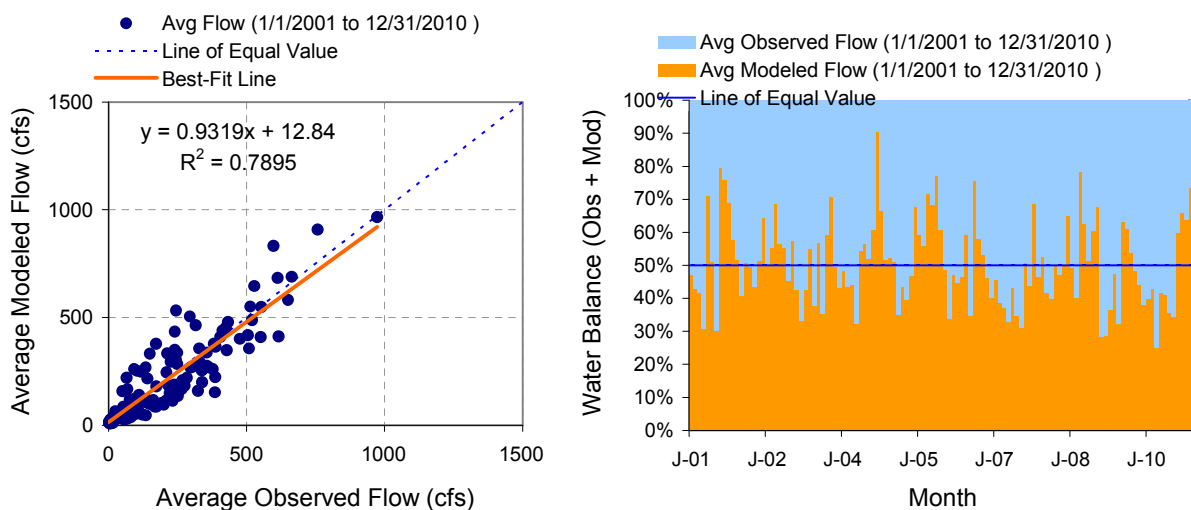


Figure A-11. Monthly flow regression and temporal variation: Model Outlet 180 vs. USGS 03298000 FLOYDS FORK AT FISHERVILLE, KY

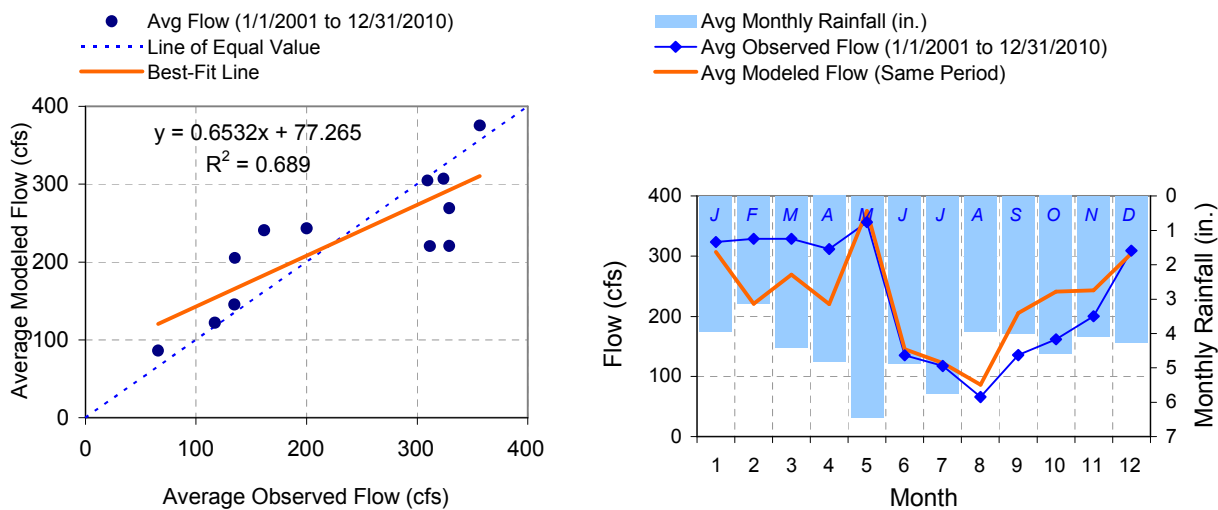


Figure A-12. Seasonal regression and temporal aggregate: Model Outlet 180 vs. USGS 03298000 FLOYDS FORK AT FISHERVILLE, KY

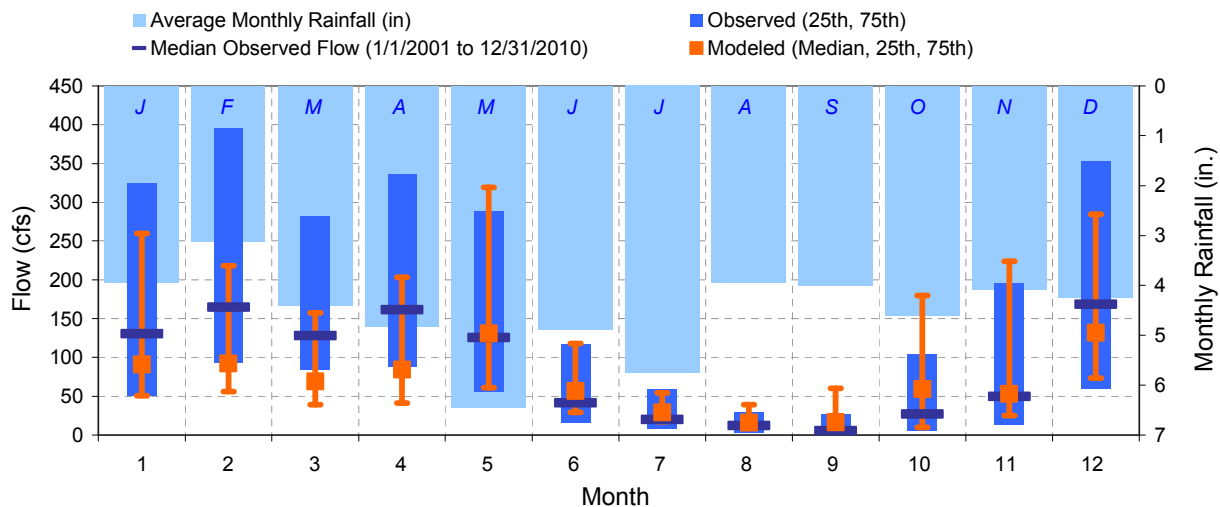


Figure A-13. Seasonal medians and ranges: Model Outlet 180 vs. USGS 03298000 FLOYDS FORK AT FISHERVILLE, KY

Table A-4. Seasonal summary: Model Outlet 180 vs. USGS 03298000 FLOYDS FORK AT FISHERVILLE, KY

MONTH	OBSERVED FLOW (CFS)				MODELED FLOW (CFS)			
	MEAN	MEDIAN	25TH	75TH	MEAN	MEDIAN	25TH	75TH
Jan	323.84	130.50	51.00	324.00	306.96	90.96	50.40	259.54
Feb	329.08	164.50	93.25	395.00	220.69	92.22	55.85	218.00
Mar	329.08	128.00	84.00	282.50	269.05	68.97	39.24	157.63
Apr	311.60	161.50	88.00	336.75	220.34	84.69	41.19	203.34
May	356.65	125.50	55.50	288.50	375.35	130.94	60.97	319.02
Jun	134.83	41.50	16.00	116.75	145.33	56.57	29.12	117.96
Jul	117.22	20.00	8.40	59.00	122.06	28.97	17.37	54.25
Aug	65.80	12.00	3.55	29.50	86.01	15.89	9.41	39.10
Sep	135.19	5.35	2.60	26.50	205.14	16.44	8.24	60.06
Oct	161.77	27.00	5.83	104.50	240.78	59.26	10.00	179.97
Nov	200.08	50.00	13.00	195.25	243.16	53.14	25.06	223.63
Dec	309.44	168.50	59.00	352.50	304.62	131.80	73.42	284.50

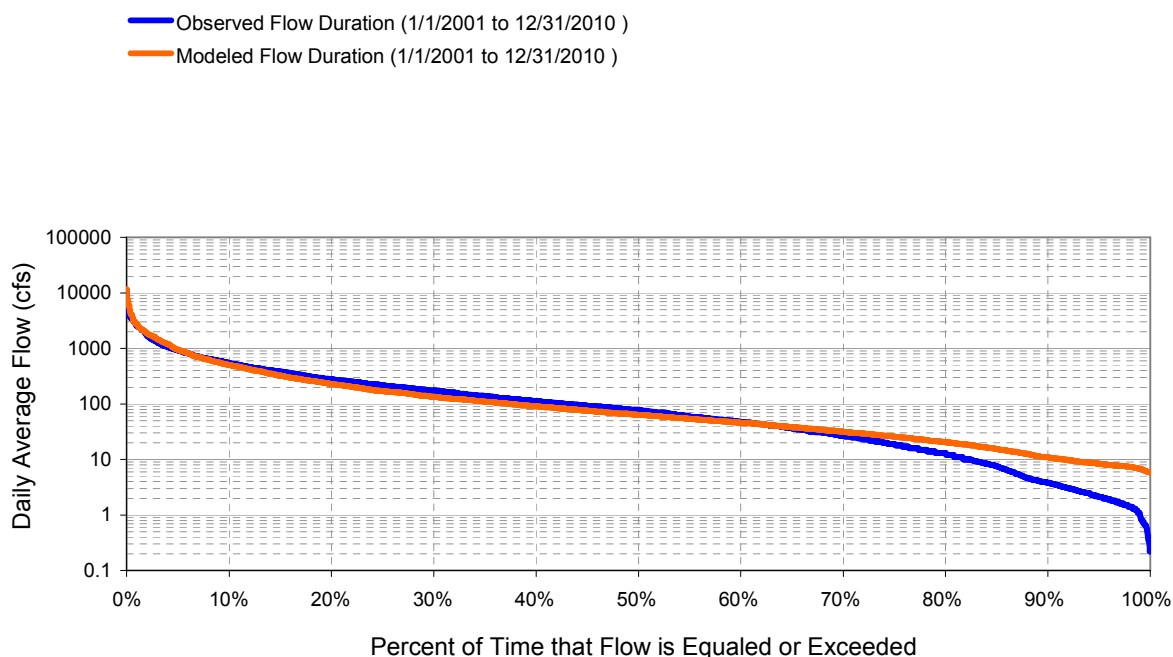


Figure A-14. Flow exceedence: Model Outlet 180 vs. USGS 03298000 FLOYDS FORK AT FISHERVILLE, KY

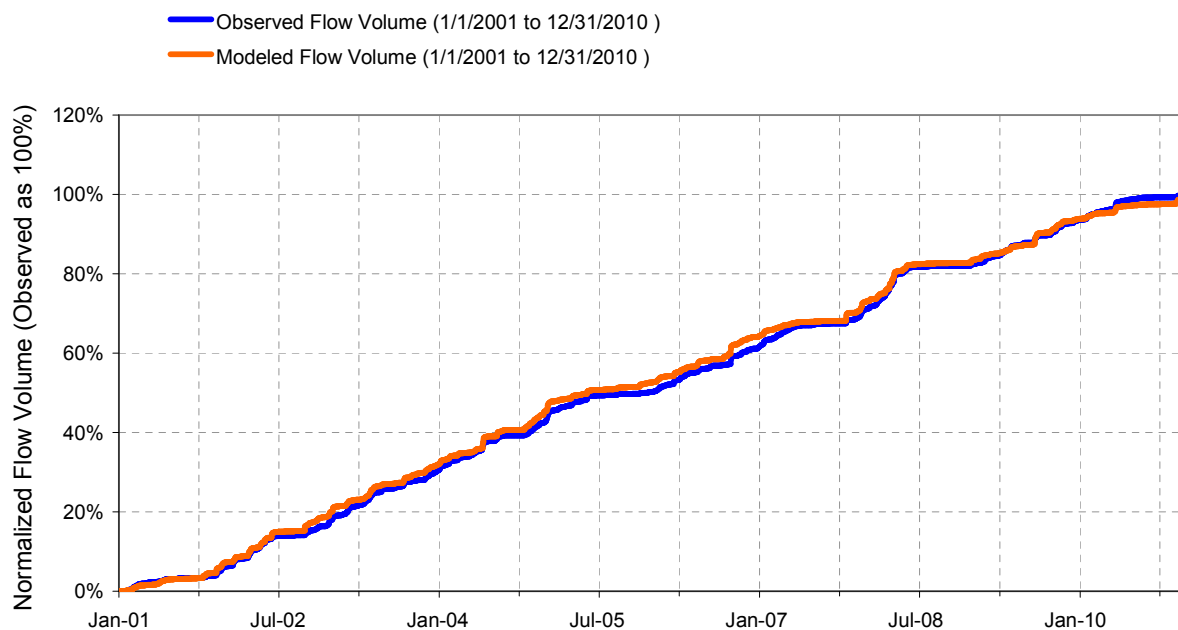


Figure A-15. Flow accumulation: Model Outlet 180 vs. USGS 03298000 FLOYDS FORK AT FISHERVILLE, KY

Table A-5. Summary statistics: Model Outlet 180 vs. USGS 03298000 FLOYDS FORK AT FISHERVILLE, KY

LSPC Simulated Flow		Observed Flow Gage	
REACH OUTFLOW FROM SUBBASIN 180 10-Year Analysis Period: 1/1/2001 - 12/31/2010 Flow volumes are (inches/year) for upstream drainage area		USGS 03298000 FLOYDS FORK AT FISHERVILLE, KY Hydrologic Unit Code: 5140102 Latitude: 38.18840166 Longitude: -85.460235 Drainage Area (sq-mi): 138	
Total Simulated In-stream Flow:	22.50	Total Observed In-stream Flow:	22.72
Total of simulated highest 10% flows:	14.19	Total of Observed highest 10% flows:	13.19
Total of Simulated lowest 50% flows:	1.41	Total of Observed Lowest 50% flows:	1.25
Simulated Summer Flow Volume (months 7-9):	3.40	Observed Summer Flow Volume (7-9):	2.62
Simulated Fall Flow Volume (months 10-12):	6.52	Observed Fall Flow Volume (10-12):	5.56
Simulated Winter Flow Volume (months 1-3):	6.49	Observed Winter Flow Volume (1-3):	7.96
Simulated Spring Flow Volume (months 4-6):	6.09	Observed Spring Flow Volume (4-6):	6.59
Total Simulated Storm Volume:	14.11	Total Observed Storm Volume:	13.81
Simulated Summer Storm Volume (7-9):	2.29	Observed Summer Storm Volume (7-9):	2.04
<i>Errors (Simulated-Observed)</i>	<i>Error Statistics</i>	<i>Recommended Criteria</i>	
Error in total volume:	-0.97	10	
Error in 50% lowest flows:	12.87	10	
Error in 10% highest flows:	7.55	15	
Seasonal volume error - Summer:	29.55	30	
Seasonal volume error - Fall:	17.43	30	
Seasonal volume error - Winter:	-18.43	30	
Seasonal volume error - Spring:	-7.54	30	
Error in storm volumes:	2.18	20	
Error in summer storm volumes:	12.18	50	
Nash-Sutcliffe Coefficient of Efficiency, E:	0.558	Model accuracy increases as E or E' approaches 1.0	
Baseline adjusted coefficient (Garlick), E':	0.517		

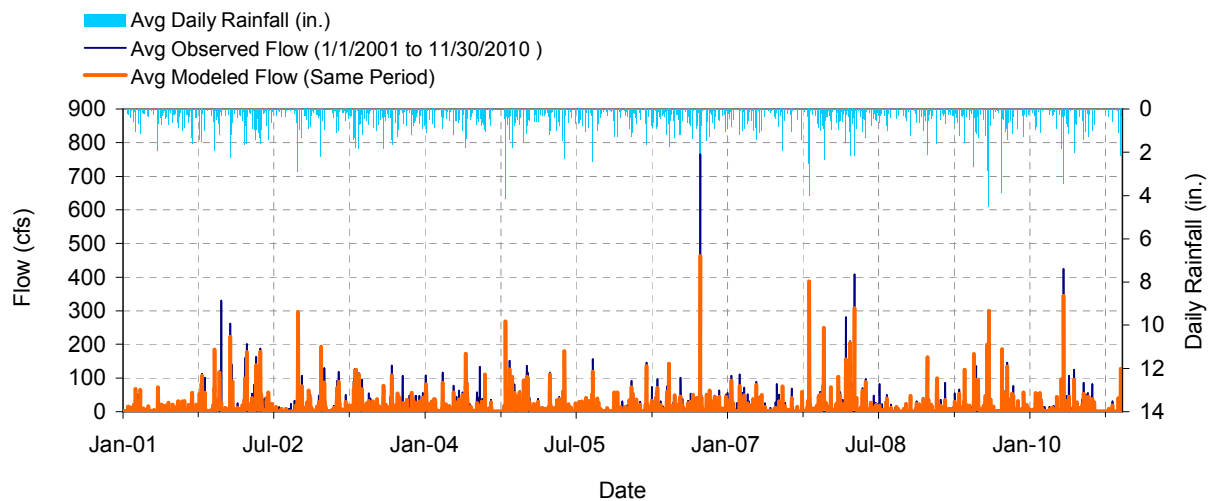


Figure A-16. Mean daily flow: Model Outlet 167 vs. USGS 03298135 CHENOWETH RUN AT RUCKRIEGAL PARKWAY, KY

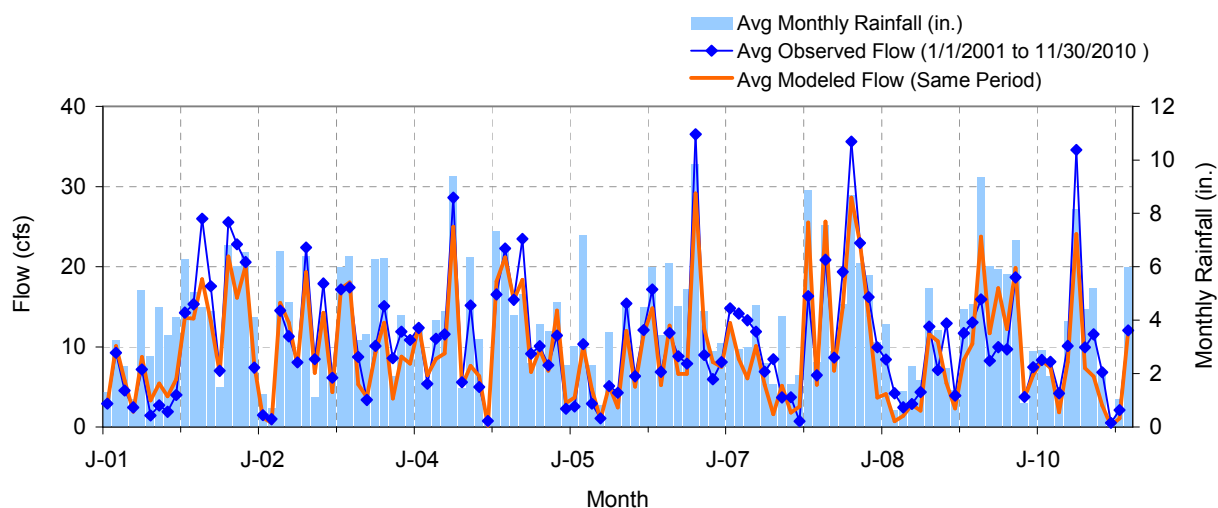


Figure A-17. Mean monthly flow: Model Outlet 167 vs. USGS 03298135 CHENOWETH RUN AT RUCKRIEGAL PARKWAY, KY

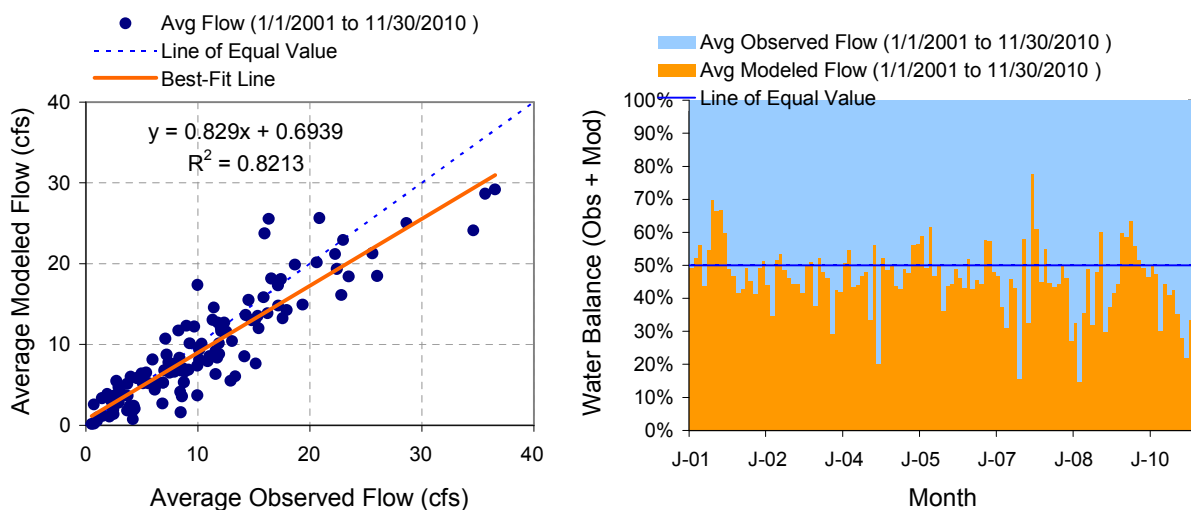


Figure A-18. Monthly flow regression and temporal variation: Model Outlet 167 vs. USGS 03298135 CHENOWETH RUN AT RUCKRIEGAL PARKWAY, KY

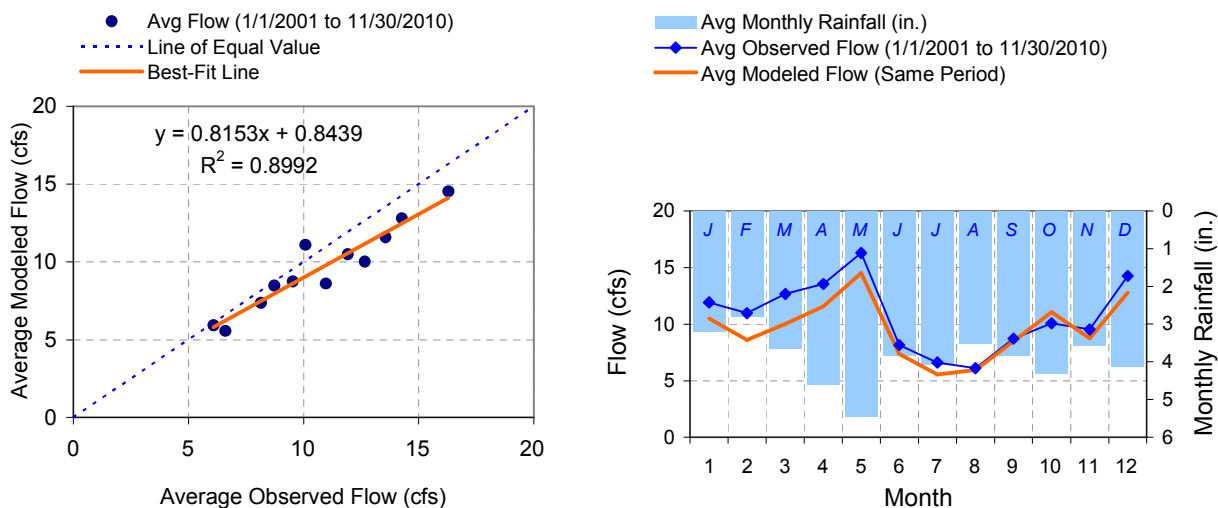


Figure A-19. Seasonal regression and temporal aggregate: Model Outlet 167 vs. USGS 03298135 CHENOWETH RUN AT RUCKRIEGAL PARKWAY, KY

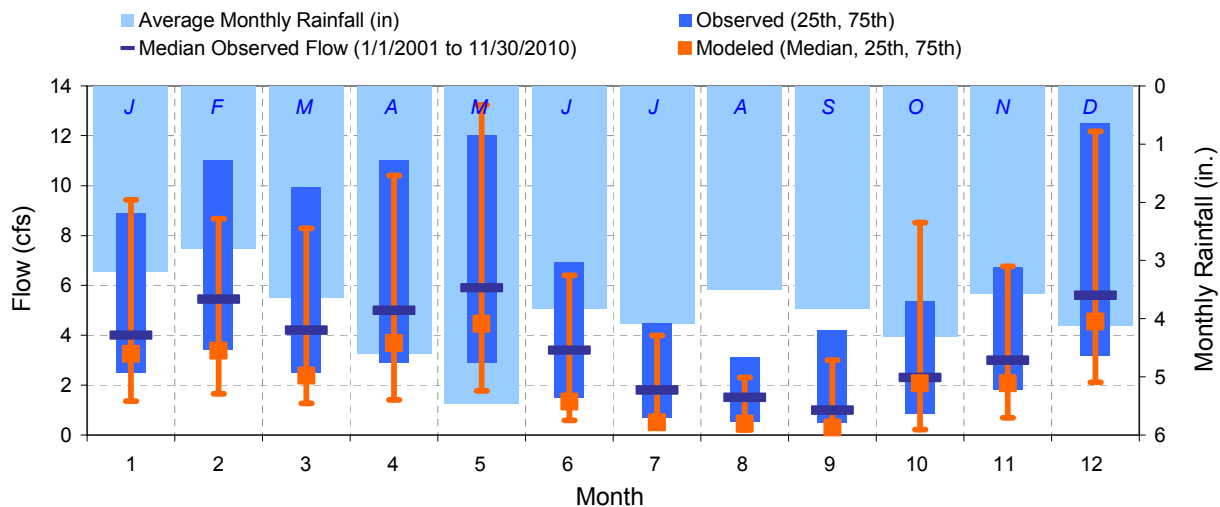


Figure A-20. Seasonal medians and ranges: Model Outlet 167 vs. USGS 03298135 CHENOWETH RUN AT RUCKRIEGAL PARKWAY, KY

Table A-6. Seasonal summary: Model Outlet 167 vs. USGS 03298135 CHENOWETH RUN AT RUCKRIEGAL PARKWAY, KY

MONTH	OBSERVED FLOW (CFS)				MODELED FLOW (CFS)			
	MEAN	MEDIAN	25TH	75TH	MEAN	MEDIAN	25TH	75TH
Jan	11.92	4.00	2.50	8.88	10.49	3.26	1.35	9.43
Feb	10.97	5.45	3.40	11.00	8.60	3.38	1.65	8.67
Mar	12.66	4.20	2.50	9.95	10.02	2.38	1.27	8.28
Apr	13.56	5.00	2.90	11.00	11.58	3.69	1.41	10.41
May	16.29	5.90	2.90	12.00	14.54	4.46	1.77	13.23
Jun	8.15	3.40	1.50	6.93	7.36	1.35	0.58	6.40
Jul	6.61	1.80	0.68	4.48	5.56	0.50	0.29	3.99
Aug	6.10	1.50	0.52	3.10	5.93	0.46	0.21	2.31
Sep	8.73	1.00	0.50	4.23	8.49	0.31	0.14	2.99
Oct	10.08	2.30	0.85	5.38	11.09	2.07	0.22	8.52
Nov	9.53	3.00	1.80	6.70	8.74	2.08	0.69	6.76
Dec	14.27	5.60	3.15	12.50	12.80	4.55	2.12	12.17

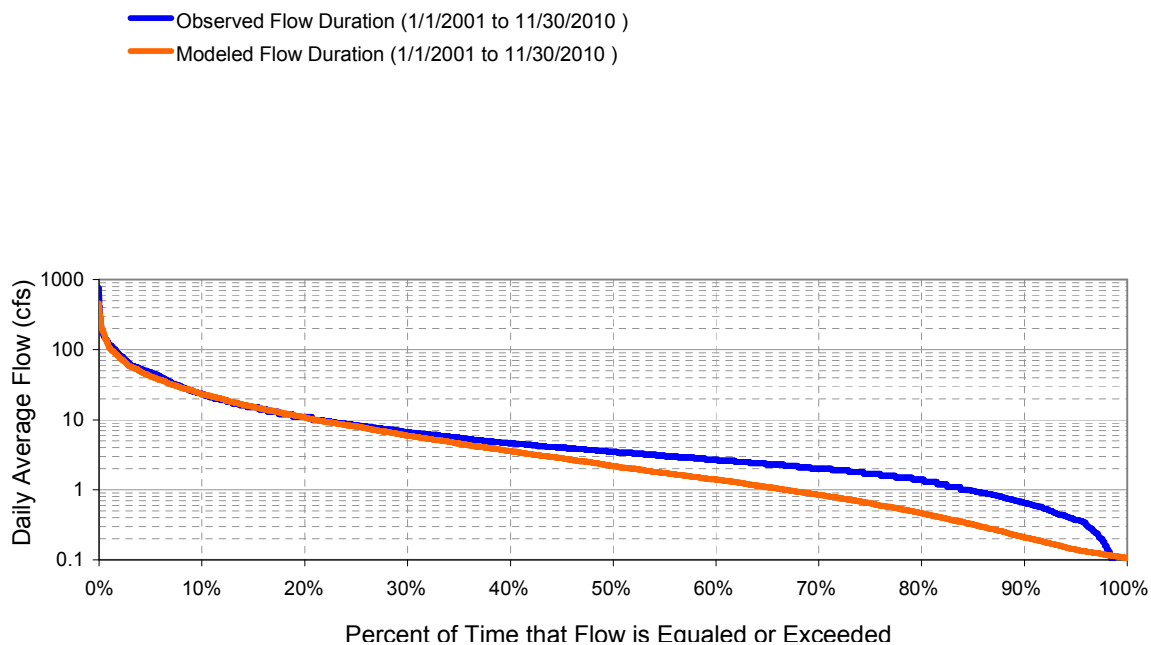


Figure A-21. Flow exceedence: Model Outlet 167 vs. USGS 03298135 CHENOWETH RUN AT RUCKRIEGAL PARKWAY, KY

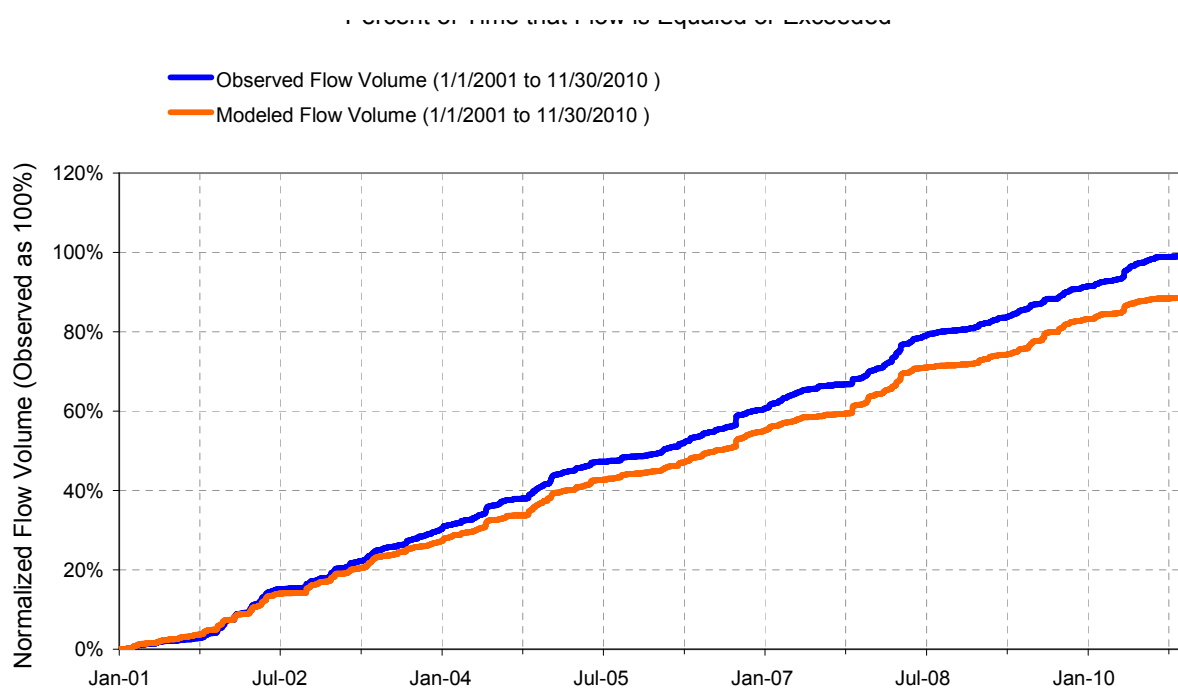


Figure A-22. Flow accumulation: Model Outlet 167 vs. USGS 03298135 CHENOWETH RUN AT RUCKRIEGAL PARKWAY, KY

Table A-7. Summary statistics: Model Outlet 167 vs. USGS 03298135 CHENOWETH RUN AT RUCKRIEGAL PARKWAY, KY

LSPC Simulated Flow		Observed Flow Gage	
REACH OUTFLOW FROM SUBBASIN 167 9.91-Year Analysis Period: 1/1/2001 - 11/30/2010 Flow volumes are (inches/year) for upstream drainage area		USGS 03298135 CHENOWETH RUN AT RUCKRIEGAL PARKWAY, KY Hydrologic Unit Code: 5140102 Latitude: 38.19479109 Longitude: -85.557181 Drainage Area (sq-mi): 5.47	
Total Simulated In-stream Flow:	23.81	Total Observed In-stream Flow:	26.61
Total of simulated highest 10% flows:	15.02	Total of Observed highest 10% flows:	16.18
Total of Simulated lowest 50% flows:	0.99	Total of Observed Lowest 50% flows:	2.10
Simulated Summer Flow Volume (months 7-9):	4.19	Observed Summer Flow Volume (7-9):	4.50
Simulated Fall Flow Volume (months 10-12):	6.61	Observed Fall Flow Volume (10-12):	6.83
Simulated Winter Flow Volume (months 1-3):	6.02	Observed Winter Flow Volume (1-3):	7.35
Simulated Spring Flow Volume (months 4-6):	6.99	Observed Spring Flow Volume (4-6):	7.93
Total Simulated Storm Volume:	12.47	Total Observed Storm Volume:	13.39
Simulated Summer Storm Volume (7-9):	2.74	Observed Summer Storm Volume (7-9):	2.80
<i>Errors (Simulated-Observed)</i>	<i>Error Statistics</i>	<i>Recommended Criteria</i>	
Error in total volume:	-10.54	10	
Error in 50% lowest flows:	-52.95	10	
Error in 10% highest flows:	-7.12	15	
Seasonal volume error - Summer:	-6.89	30	
Seasonal volume error - Fall:	-3.34	30	
Seasonal volume error - Winter:	-18.04	30	
Seasonal volume error - Spring:	-11.88	30	
Error in storm volumes:	-6.85	20	
Error in summer storm volumes:	-2.00	50	
Nash-Sutcliffe Coefficient of Efficiency, E:	0.773	Model accuracy increases as E or E' approaches 1.0	
Baseline adjusted coefficient (Garlick), E':	0.612		

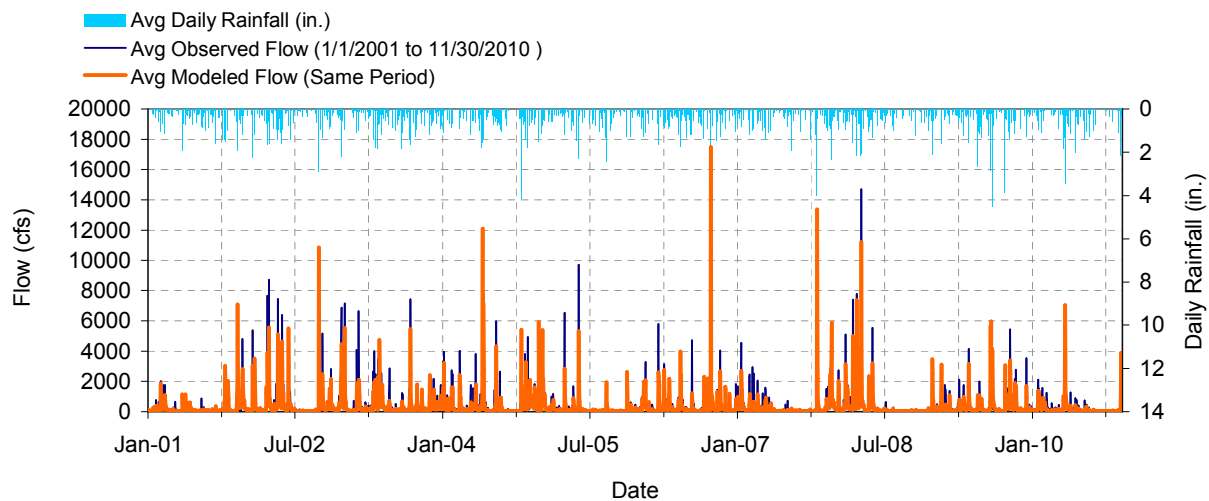


Figure A-23. Mean daily flow: Model Outlet 606 vs. USGS 03298200 FLOYDS FORK NEAR MT WASHINGTON, KY

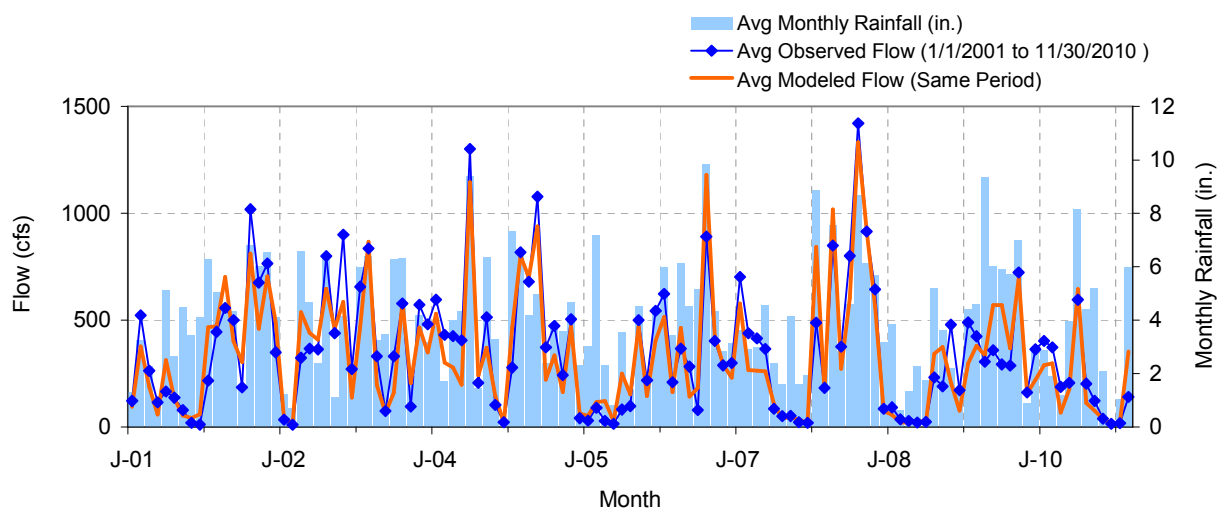


Figure A-24. Mean monthly flow: Model Outlet 606 vs. USGS 03298200 FLOYDS FORK NEAR MT WASHINGTON, KY

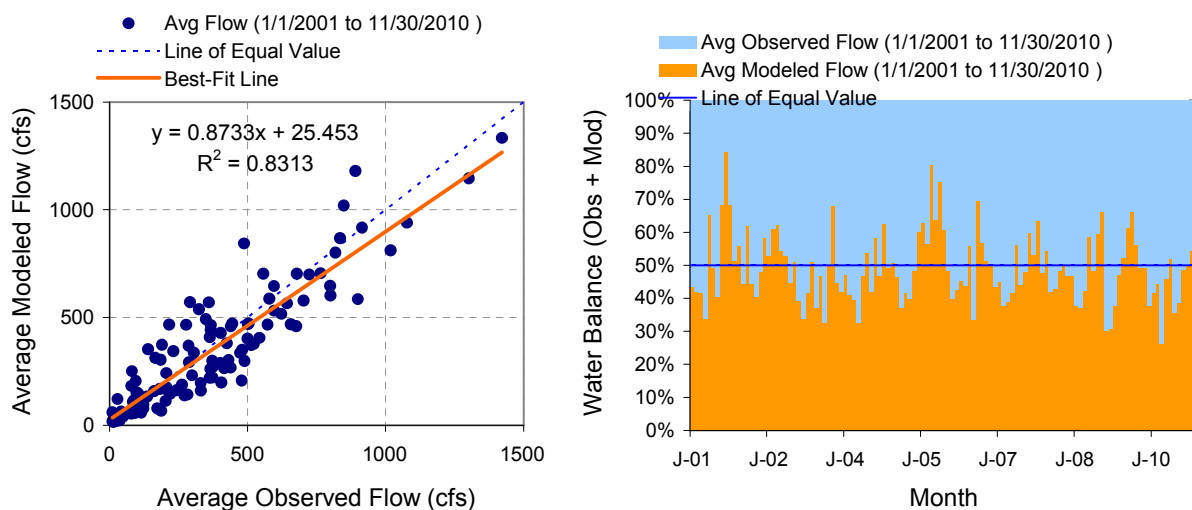


Figure A-25. Monthly flow regression and temporal variation: Model Outlet 606 vs. USGS 03298200 FLOYDS FORK NEAR MT WASHINGTON, KY

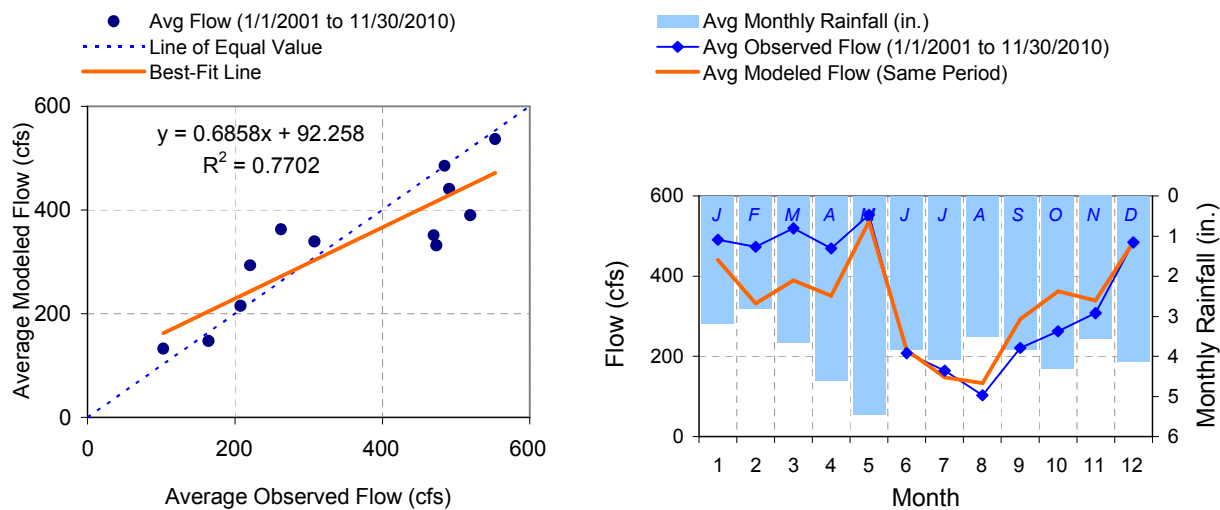


Figure A-26. Seasonal regression and temporal aggregate: Model Outlet 606 vs. USGS 03298200 FLOYDS FORK NEAR MT WASHINGTON, KY

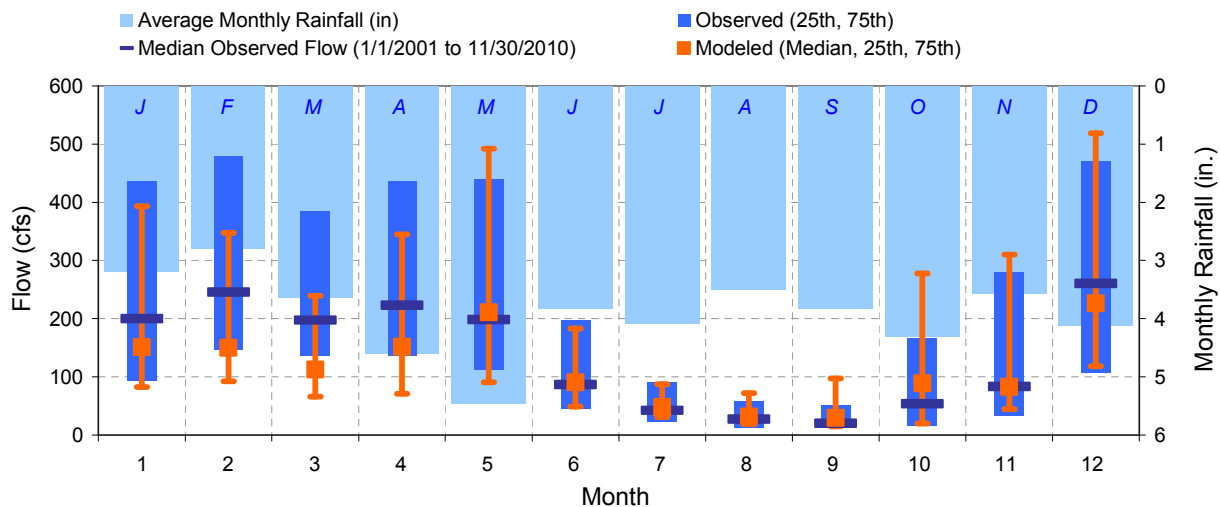


Figure A-27. Seasonal medians and ranges: Model Outlet 606 vs. USGS 03298200 FLOYDS FORK NEAR MT WASHINGTON, KY

Table A-8. Seasonal summary: Model Outlet 606 vs. USGS 03298200 FLOYDS FORK NEAR MT WASHINGTON, KY

MONTH	OBSERVED FLOW (CFS)				MODELED FLOW (CFS)			
	MEAN	MEDIAN	25TH	75TH	MEAN	MEDIAN	25TH	75TH
Jan	490.93	200.00	94.00	437.00	440.76	150.70	82.26	393.32
Feb	473.38	245.50	146.50	479.00	331.71	149.92	92.35	347.53
Mar	519.19	197.50	136.25	385.25	389.69	112.25	65.89	239.26
Apr	469.78	223.00	135.75	435.25	351.29	151.72	70.73	345.02
May	553.07	198.50	111.25	439.50	536.53	211.21	90.50	492.36
Jun	207.75	86.50	44.75	196.75	215.43	90.28	48.92	182.89
Jul	164.19	42.50	23.00	90.75	147.56	48.00	30.58	87.44
Aug	102.67	27.00	13.00	58.75	132.86	31.43	18.72	72.24
Sep	220.62	20.00	14.00	51.00	293.13	29.73	14.71	97.23
Oct	262.61	54.00	15.00	166.00	362.66	89.18	19.29	277.49
Nov	308.00	83.50	33.50	279.50	339.30	82.50	44.51	310.19
Dec	484.37	260.00	106.50	470.00	485.20	226.08	118.32	518.84

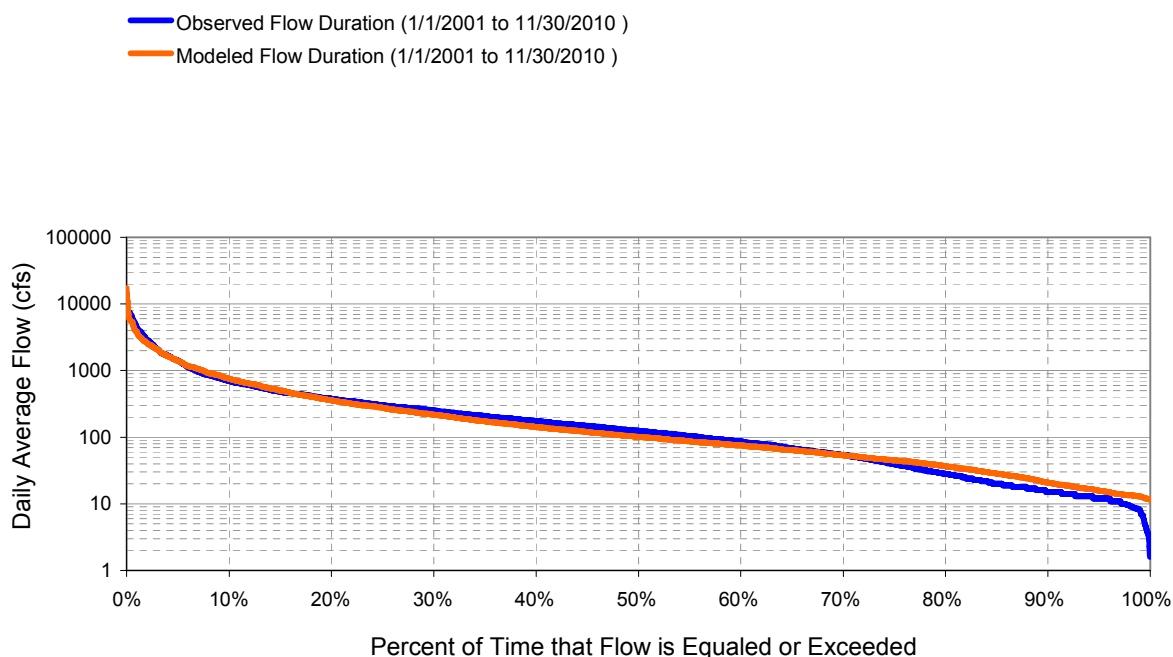


Figure A-28. Flow exceedence: Model Outlet 606 vs. USGS 03298200 FLOYDS FORK NEAR MT WASHINGTON, KY

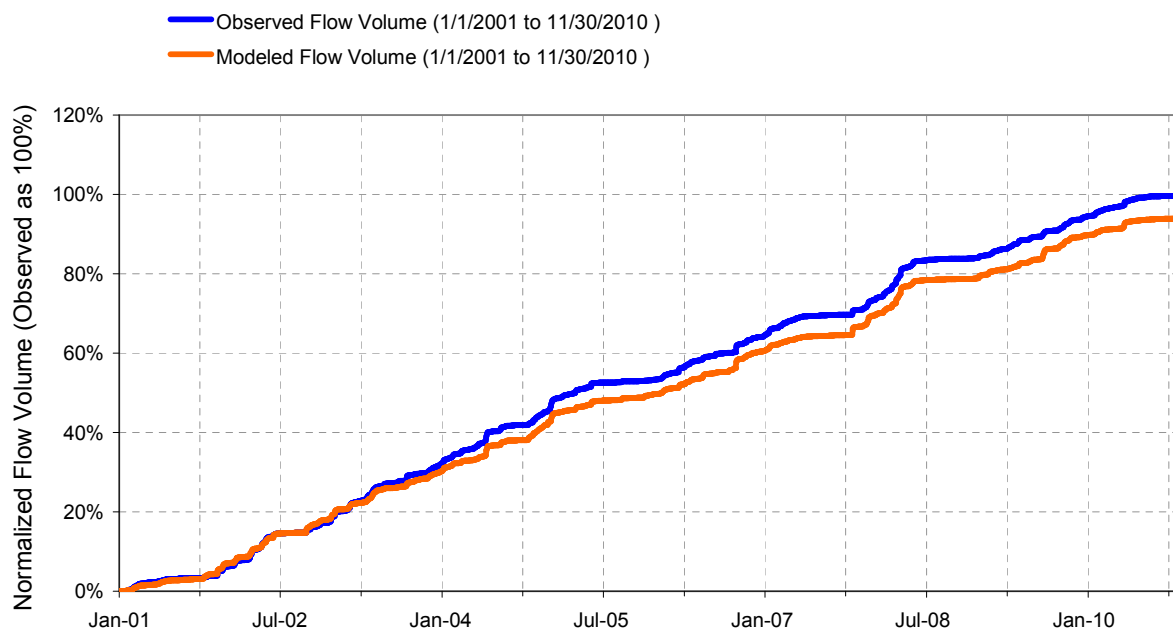


Figure A-29. Flow accumulation: Model Outlet 606 vs. USGS 03298200 FLOYDS FORK NEAR MT WASHINGTON, KY

Table A-9. Summary statistics: Model Outlet 606 vs. USGS 03298200 FLOYDS FORK NEAR MT WASHINGTON, KY

LSPC Simulated Flow		Observed Flow Gage	
REACH OUTFLOW FROM SUBBASIN 606 9.91-Year Analysis Period: 1/1/2001 - 11/30/2010 Flow volumes are (inches/year) for upstream drainage area		USGS 03298200 FLOYDS FORK NEAR MT WASHINGTON, KY Hydrologic Unit Code: 5140102 Latitude: 38.08534216 Longitude: -85.5549556 Drainage Area (sq-mi): 213	
Total Simulated In-stream Flow:	21.34	Total Observed In-stream Flow:	22.53
Total of simulated highest 10% flows:	12.81	Total of Observed highest 10% flows:	13.49
Total of Simulated lowest 50% flows:	1.54	Total of Observed Lowest 50% flows:	1.57
Simulated Summer Flow Volume (months 7-9):	3.08	Observed Summer Flow Volume (7-9):	2.62
Simulated Fall Flow Volume (months 10-12):	6.16	Observed Fall Flow Volume (10-12):	5.44
Simulated Winter Flow Volume (months 1-3):	6.18	Observed Winter Flow Volume (1-3):	7.87
Simulated Spring Flow Volume (months 4-6):	5.92	Observed Spring Flow Volume (4-6):	6.60
Total Simulated Storm Volume:	12.48	Total Observed Storm Volume:	13.71
Simulated Summer Storm Volume (7-9):	2.01	Observed Summer Storm Volume (7-9):	1.92
<i>Errors (Simulated-Observed)</i>	<i>Error Statistics</i>	<i>Recommended Criteria</i>	
Error in total volume:	-5.27	10	
Error in 50% lowest flows:	-1.95	10	
Error in 10% highest flows:	-5.08	15	
Seasonal volume error - Summer:	17.43	30	
Seasonal volume error - Fall:	13.15	30	
Seasonal volume error - Winter:	-21.42	30	
Seasonal volume error - Spring:	-10.24	30	
Error in storm volumes:	-9.02	20	
Error in summer storm volumes:	4.82	50	
Nash-Sutcliffe Coefficient of Efficiency, E:	0.686	Model accuracy increases as E or E' approaches 1.0	
Baseline adjusted coefficient (Garlick), E':	0.545		

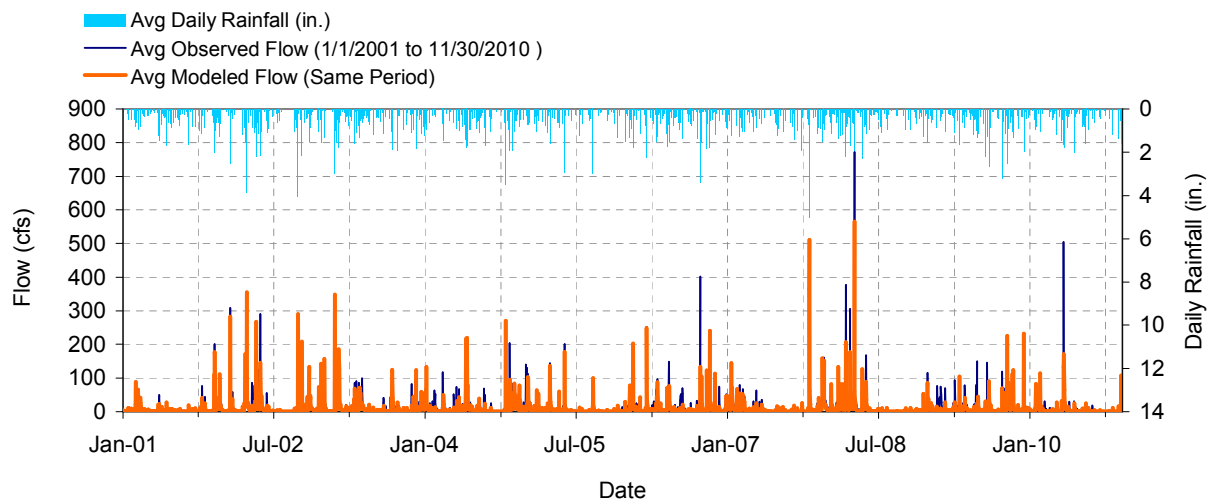


Figure A-30. Mean daily flow: Model Outlet 130 vs. USGS 03298300 PENNSLYVANIA RUN AT MT WASHINGTON RD NR LOUISVILLE

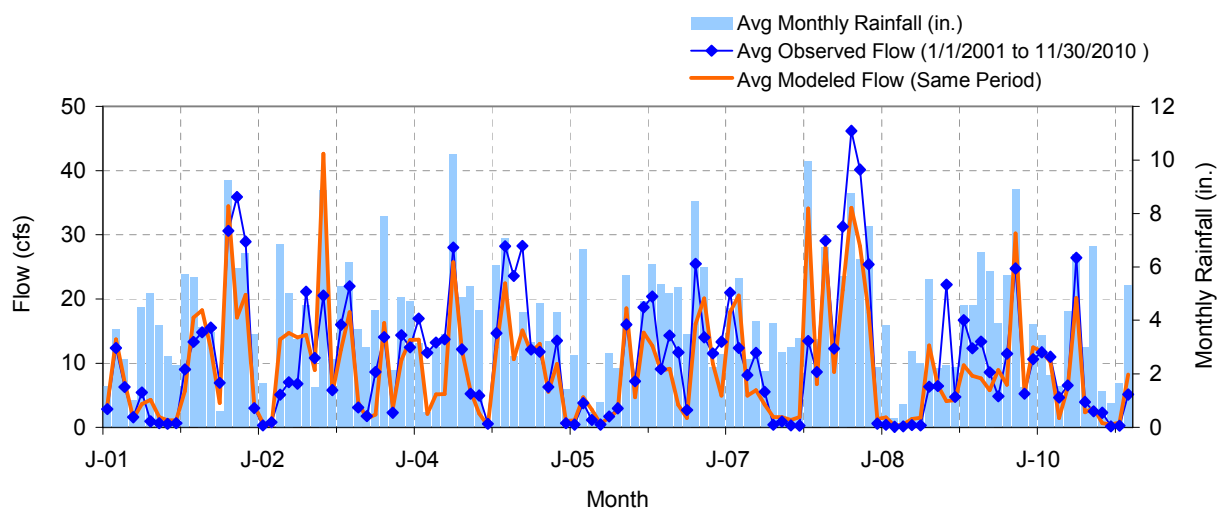


Figure A-31. Mean monthly flow: Model Outlet 130 vs. USGS 03298300 PENNSLYVANIA RUN AT MT WASHINGTON RD NR LOUISVILLE

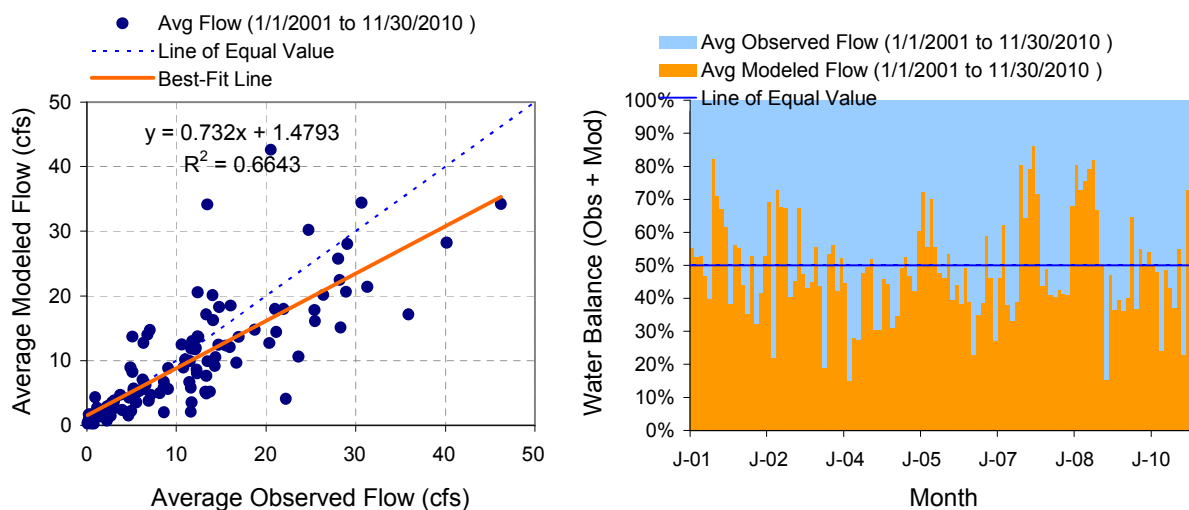


Figure A-32. Monthly flow regression and temporal variation: Model Outlet 130 vs. USGS 03298300 PENNSYLVANIA RUN AT MT WASHINGTON RD NR LOUISVILLE

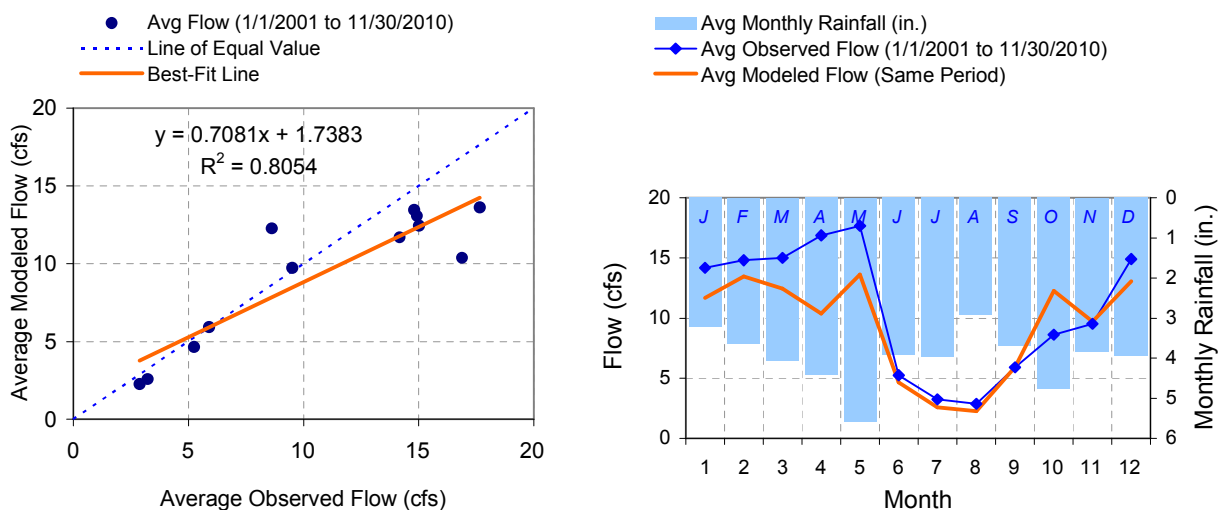


Figure A-33. Seasonal regression and temporal aggregate: Model Outlet 130 vs. USGS 03298300 PENNSYLVANIA RUN AT MT WASHINGTON RD NR LOUISVILLE

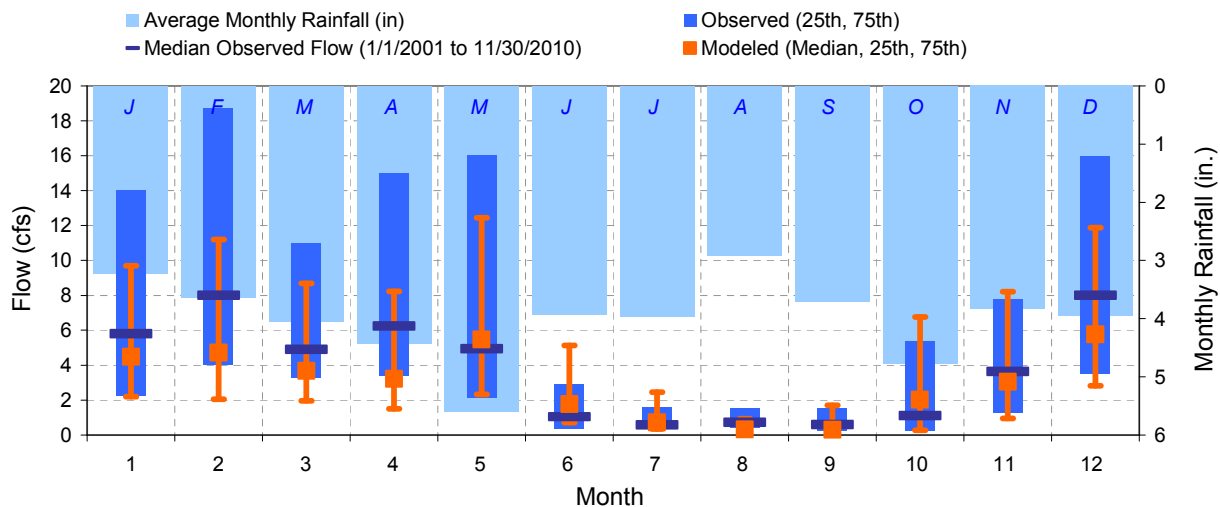


Figure A-34. Seasonal medians and ranges: Model Outlet 130 vs. USGS 03298300
PENNSLYVANIA RUN AT MT WASHINGTON RD NR LOUISVILLE

Table A-10. Seasonal summary: Model Outlet 130 vs. USGS 03298300 PENNSLYVANIA
RUN AT MT WASHINGTON RD NR LOUISVILLE

MONTH	OBSERVED FLOW (CFS)				MODELED FLOW (CFS)			
	MEAN	MEDIAN	25TH	75TH	MEAN	MEDIAN	25TH	75TH
Jan	14.18	5.80	2.23	14.00	11.70	4.48	2.19	9.70
Feb	14.80	8.00	4.05	18.75	13.46	4.72	2.05	11.20
Mar	15.01	4.90	3.30	11.00	12.45	3.67	1.96	8.69
Apr	16.88	6.25	3.40	15.00	10.39	3.22	1.49	8.22
May	17.66	4.95	2.10	16.00	13.61	5.47	2.33	12.45
Jun	5.24	1.05	0.39	2.93	4.65	1.77	0.72	5.12
Jul	3.23	0.58	0.32	1.58	2.58	0.72	0.33	2.45
Aug	2.88	0.72	0.39	1.50	2.26	0.33	0.25	0.93
Sep	5.90	0.60	0.24	1.50	5.92	0.31	0.23	1.70
Oct	8.62	1.10	0.27	5.38	12.27	2.03	0.26	6.76
Nov	9.51	3.65	1.30	7.80	9.73	3.05	0.94	8.20
Dec	14.92	8.00	3.55	16.00	13.07	5.76	2.82	11.88

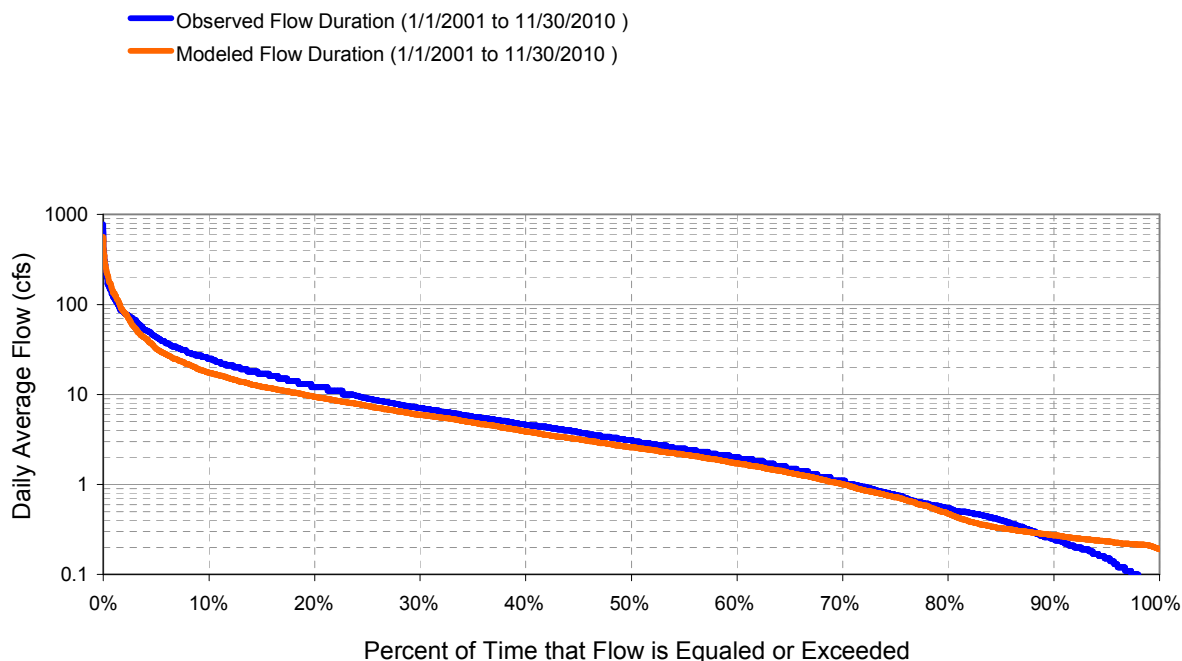


Figure A-35. Flow exceedence: Model Outlet 130 vs. USGS 03298300 PENNSLYVANIA RUN AT MT WASHINGTON RD NR LOUISVILLE

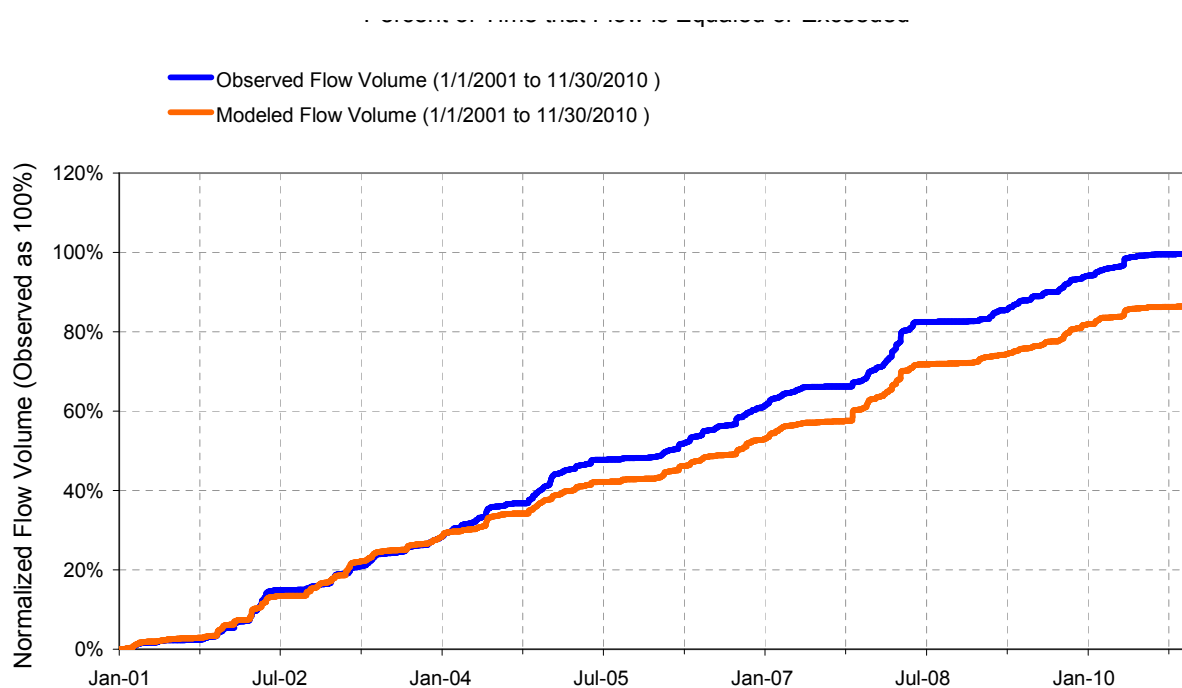


Figure A-36. Flow accumulation: Model Outlet 130 vs. USGS 03298300 PENNSLYVANIA RUN AT MT WASHINGTON RD NR LOUISVILLE

Table A-11. Summary statistics: Model Outlet 130 vs. USGS 03298300 PENNSLYVANIA RUN AT MT WASHINGTON RD NR LOUISVILLE

LSPC Simulated Flow		Observed Flow Gage	
REACH OUTFLOW FROM SUBBASIN 130 9.91-Year Analysis Period: 1/1/2001 - 11/30/2010 Flow volumes are (inches/year) for upstream drainage area		USGS 03298300 PENNSLYVANIA RUN AT MT WASHINGTON RD NR LOUISVILLE Hydrologic Unit Code: 5140102 Latitude: 38.08756629 Longitude: -85.642458 Drainage Area (sq-mi): 6.4	
Total Simulated In-stream Flow:	19.73	Total Observed In-stream Flow:	22.68
Total of simulated highest 10% flows:	12.71	Total of Observed highest 10% flows:	13.84
Total of Simulated lowest 50% flows:	1.02	Total of Observed Lowest 50% flows:	1.13
Simulated Summer Flow Volume (months 7-9):	1.92	Observed Summer Flow Volume (7-9):	2.15
Simulated Fall Flow Volume (months 10-12):	6.08	Observed Fall Flow Volume (10-12):	5.68
Simulated Winter Flow Volume (months 1-3):	6.61	Observed Winter Flow Volume (1-3):	7.75
Simulated Spring Flow Volume (months 4-6):	5.12	Observed Spring Flow Volume (4-6):	7.10
Total Simulated Storm Volume:	9.16	Total Observed Storm Volume:	8.91
Simulated Summer Storm Volume (7-9):	0.95	Observed Summer Storm Volume (7-9):	1.07
<i>Errors (Simulated-Observed)</i>	<i>Error Statistics</i>	<i>Recommended Criteria</i>	
Error in total volume:	-13.00	10	
Error in 50% lowest flows:	-9.77	10	
Error in 10% highest flows:	-8.12	15	
Seasonal volume error - Summer:	-10.58	30	
Seasonal volume error - Fall:	7.01	30	
Seasonal volume error - Winter:	-14.68	30	
Seasonal volume error - Spring:	-27.91	30	
Error in storm volumes:	2.80	20	
Error in summer storm volumes:	-10.97	50	
Nash-Sutcliffe Coefficient of Efficiency, E:	0.389	Model accuracy increases as E or E' approaches 1.0	
Baseline adjusted coefficient (Garlick), E':	0.445		

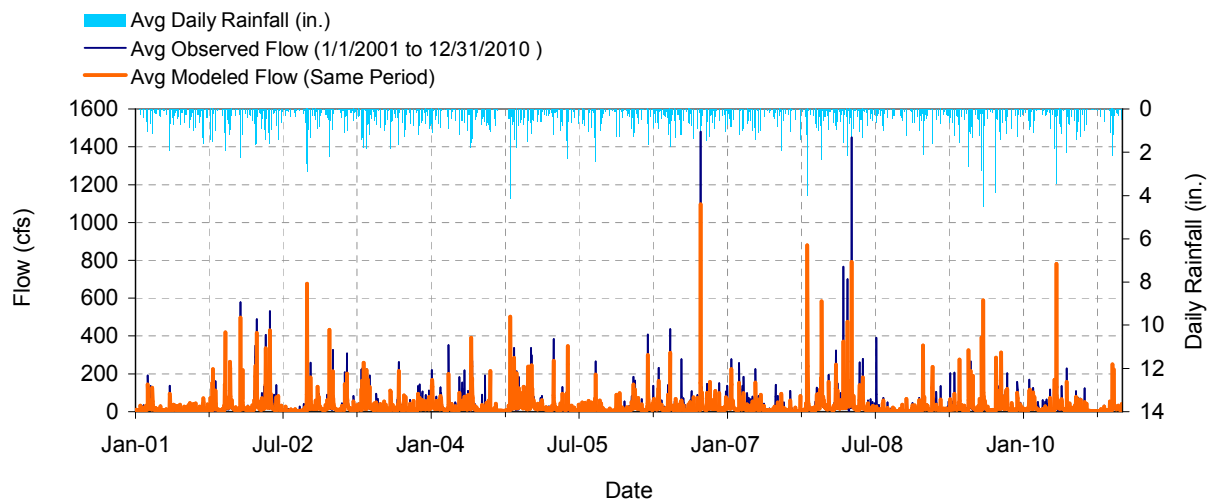


Figure A-37. Mean daily flow: Model Outlet 609 vs. USGS 03298150 CHENOWETH RUN AT GELHAUS LANE NEAR FERN CREEK, KY

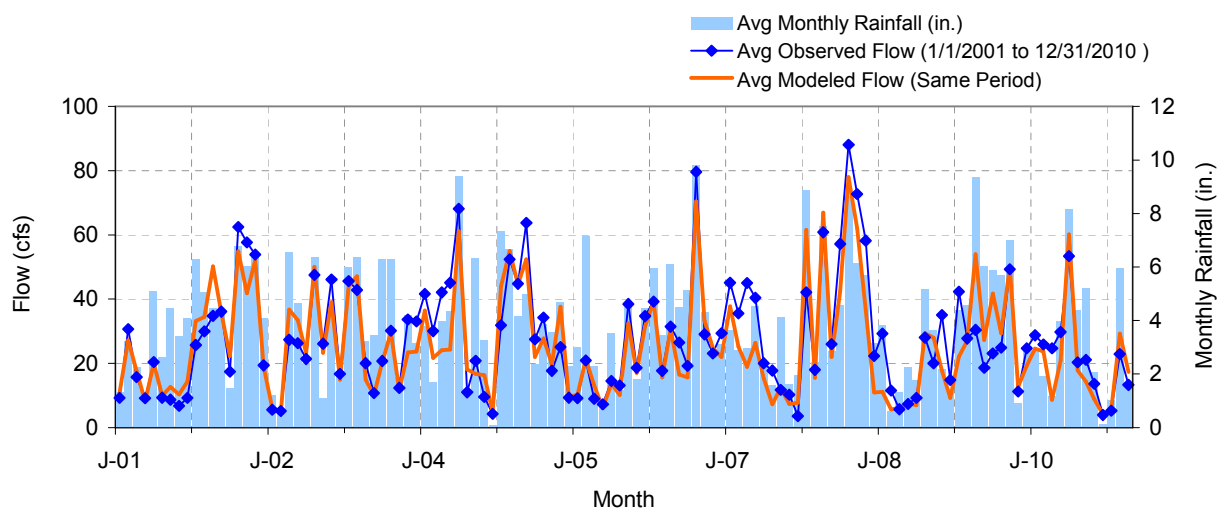


Figure A-38. Mean monthly flow: Model Outlet 609 vs. USGS 03298150 CHENOWETH RUN AT GELHAUS LANE NEAR FERN CREEK, KY

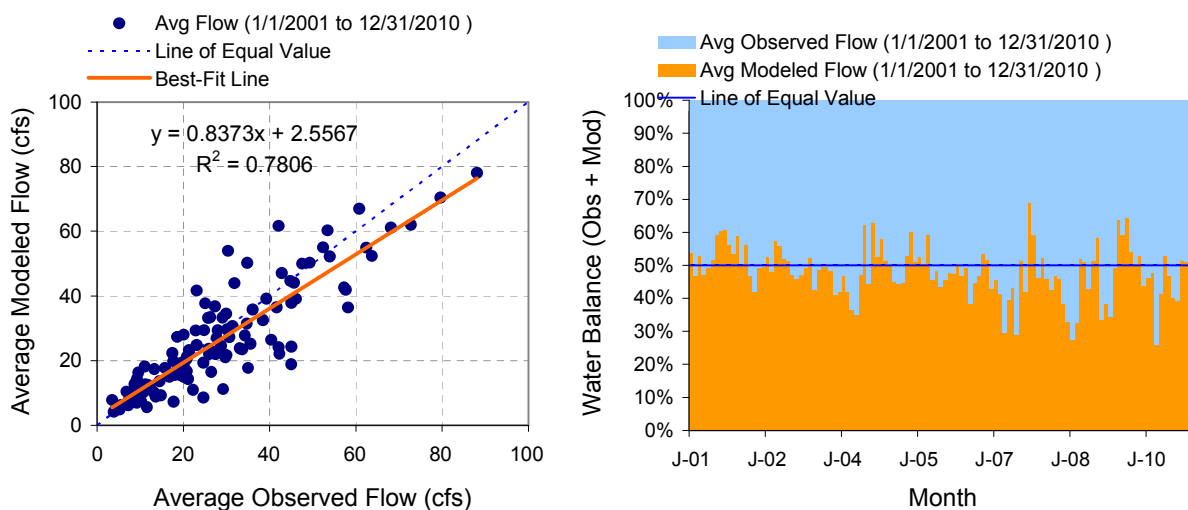


Figure A-39. Monthly flow regression and temporal variation: Model Outlet 609 vs. USGS 03298150 CHENOWETH RUN AT GELHAUS LANE NEAR FERN CREEK, KY

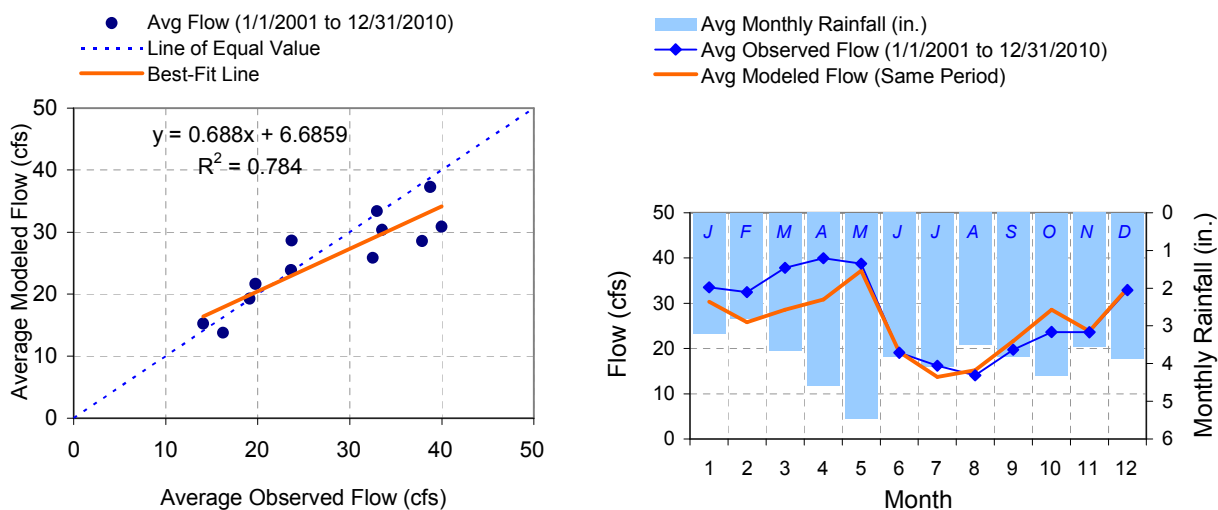


Figure A-40. Seasonal regression and temporal aggregate: Model Outlet 609 vs. USGS 03298150 CHENOWETH RUN AT GELHAUS LANE NEAR FERN CREEK, KY

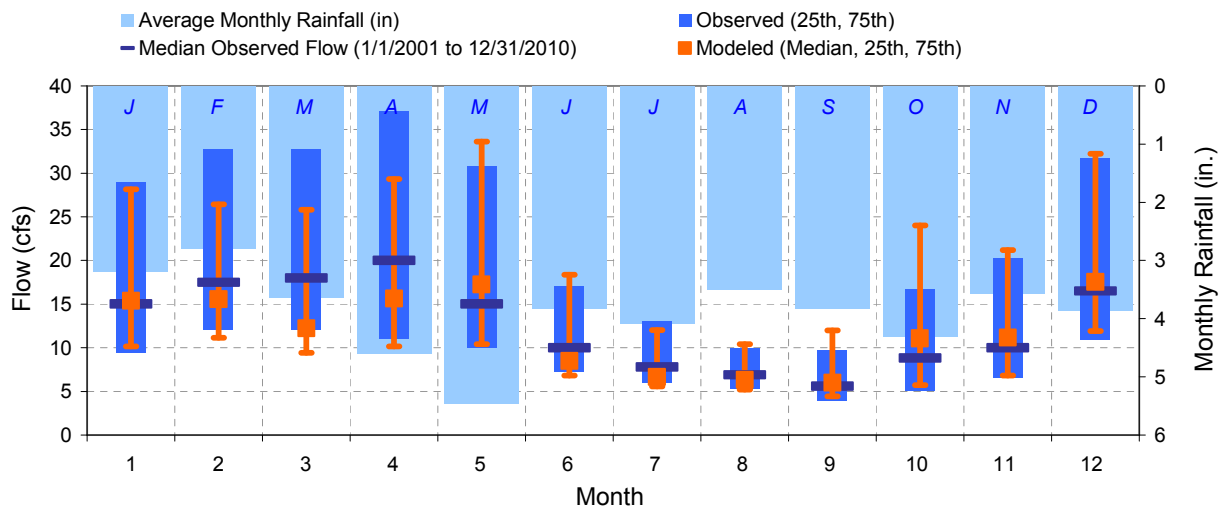


Figure A-41. Seasonal medians and ranges: Model Outlet 609 vs. USGS 03298150 CHENOWETH RUN AT GELHAUS LANE NEAR FERN CREEK, KY

Table A-12. Seasonal summary: Model Outlet 609 vs. USGS 03298150 CHENOWETH RUN AT GELHAUS LANE NEAR FERN CREEK, KY

MONTH	OBSERVED FLOW (CFS)				MODELED FLOW (CFS)			
	MEAN	MEDIAN	25TH	75TH	MEAN	MEDIAN	25TH	75TH
Jan	33.51	15.00	9.50	29.00	30.35	15.41	10.13	28.15
Feb	32.48	17.50	12.00	32.75	25.87	15.57	11.14	26.43
Mar	37.86	18.00	12.00	32.75	28.56	12.23	9.44	25.79
Apr	39.97	20.00	11.00	37.00	30.86	15.65	10.16	29.34
May	38.75	15.00	9.93	30.75	37.25	17.25	10.42	33.62
Jun	19.11	10.00	7.18	17.00	19.24	8.48	6.81	18.36
Jul	16.21	7.80	6.00	13.00	13.74	6.63	5.56	12.03
Aug	14.08	6.90	5.30	10.00	15.22	6.34	5.21	10.40
Sep	19.75	5.60	4.00	9.75	21.63	6.00	4.44	11.99
Oct	23.66	8.80	5.10	16.75	28.64	11.06	5.69	24.02
Nov	23.63	10.00	6.60	20.25	23.87	11.17	6.80	21.18
Dec	32.95	16.50	11.00	31.75	33.37	17.54	11.91	32.19

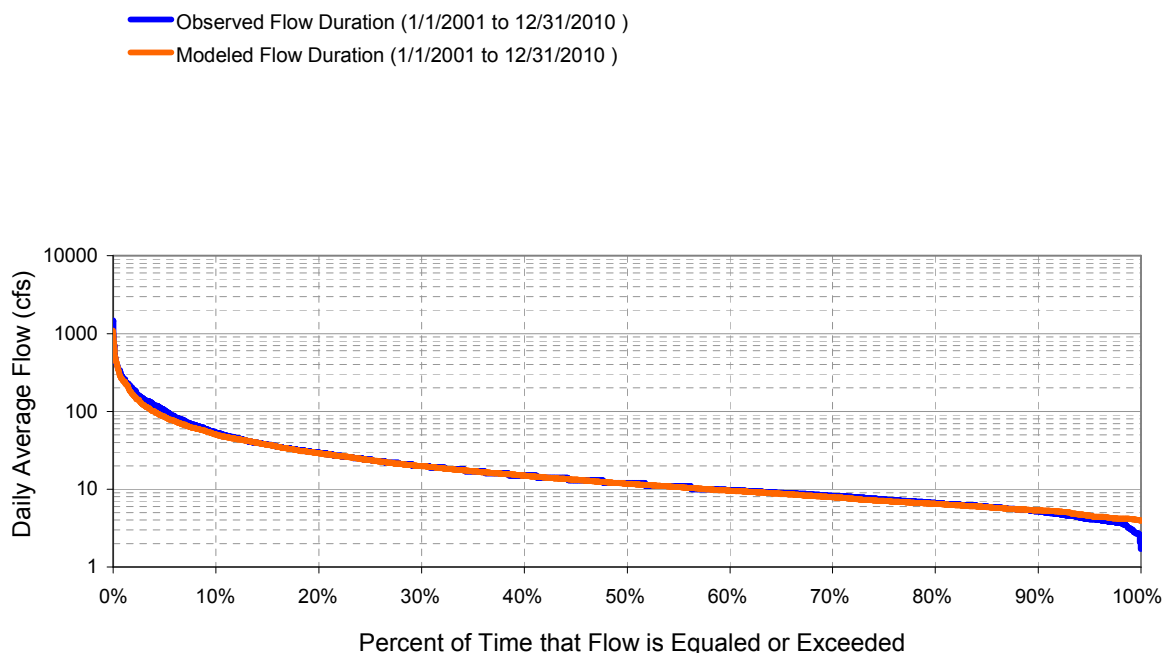


Figure A-42. Flow exceedence: Model Outlet 609 vs. USGS 03298150 CHENOWETH RUN AT GELHAUS LANE NEAR FERN CREEK, KY

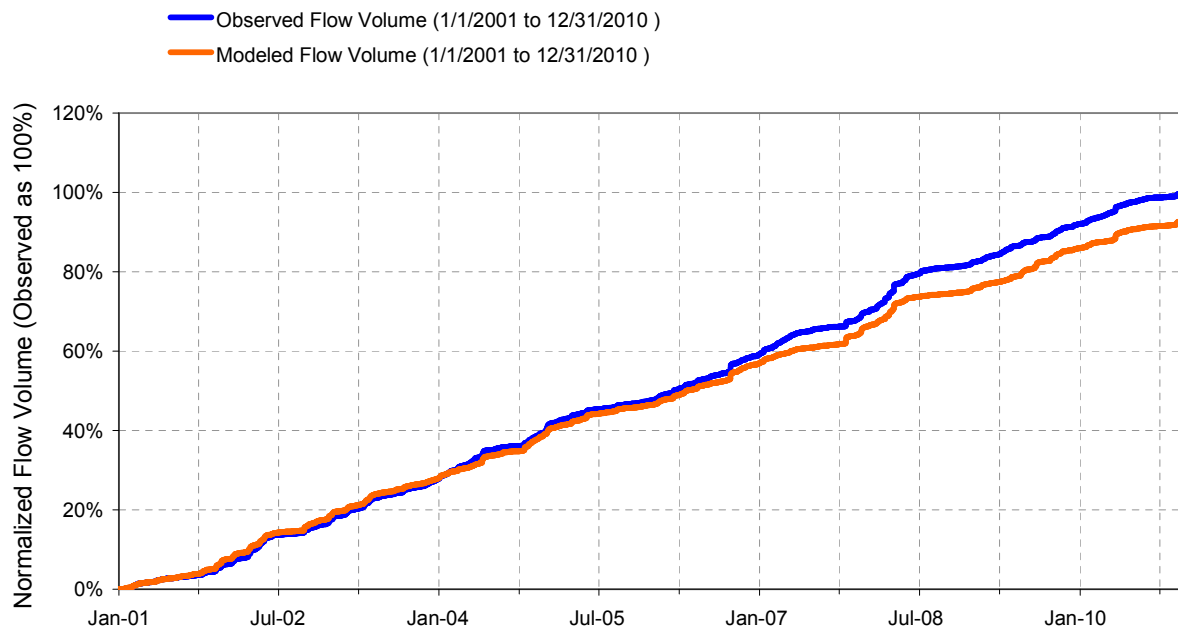


Figure A-43. Flow accumulation: Model Outlet 609 vs. USGS 03298150 CHENOWETH RUN AT GELHAUS LANE NEAR FERN CREEK, KY

Table A-13. Summary statistics: Model Outlet 609 vs. USGS 03298150 CHENOWETH RUN AT GELHAUS LANE NEAR FERN CREEK, KY

LSPC Simulated Flow		Observed Flow Gage	
REACH OUTFLOW FROM SUBBASIN 609 10-Year Analysis Period: 1/1/2001 - 12/31/2010 Flow volumes are (inches/year) for upstream drainage area		USGS 03298150 CHENOWETH RUN AT GELHAUS LANE NEAR FERN CREEK, KY Hydrologic Unit Code: 5140102 Latitude: 38.16006729 Longitude: -85.5421797 Drainage Area (sq-mi): 11.6	
Total Simulated In-stream Flow:	30.14	Total Observed In-stream Flow:	32.38
Total of simulated highest 10% flows:	15.03	Total of Observed highest 10% flows:	17.10
Total of Simulated lowest 50% flows:	4.33	Total of Observed Lowest 50% flows:	4.37
Simulated Summer Flow Volume (months 7-9):	4.96	Observed Summer Flow Volume (7-9):	4.91
Simulated Fall Flow Volume (months 10-12):	8.46	Observed Fall Flow Volume (10-12):	7.90
Simulated Winter Flow Volume (months 1-3):	8.20	Observed Winter Flow Volume (1-3):	10.03
Simulated Spring Flow Volume (months 4-6):	8.52	Observed Spring Flow Volume (4-6):	9.53
Total Simulated Storm Volume:	10.77	Total Observed Storm Volume:	12.72
Simulated Summer Storm Volume (7-9):	2.08	Observed Summer Storm Volume (7-9):	2.19
<i>Errors (Simulated-Observed)</i>	<i>Error Statistics</i>	<i>Recommended Criteria</i>	
Error in total volume:	-6.91	10	
Error in 50% lowest flows:	-0.90	10	
Error in 10% highest flows:	-12.11	15	
Seasonal volume error - Summer:	0.99	30	
Seasonal volume error - Fall:	7.10	30	
Seasonal volume error - Winter:	-18.31	30	
Seasonal volume error - Spring:	-10.61	30	
Error in storm volumes:	-15.28	20	
Error in summer storm volumes:	-4.79	50	
Nash-Sutcliffe Coefficient of Efficiency, E:	0.794	Model accuracy increases as E or E' approaches 1.0	
Baseline adjusted coefficient (Garlick), E':	0.606		

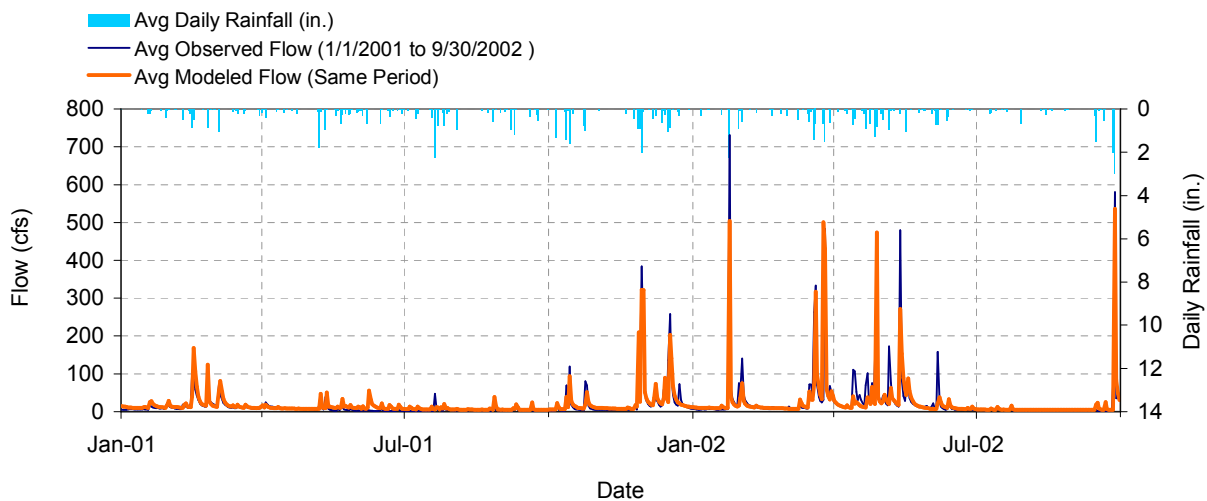


Figure A-44. Mean daily flow: Model Outlet 134 vs. USGS 03298250 CEDAR CREEK AT THIXTON ROAD NEAR LOUISVILLE, KY

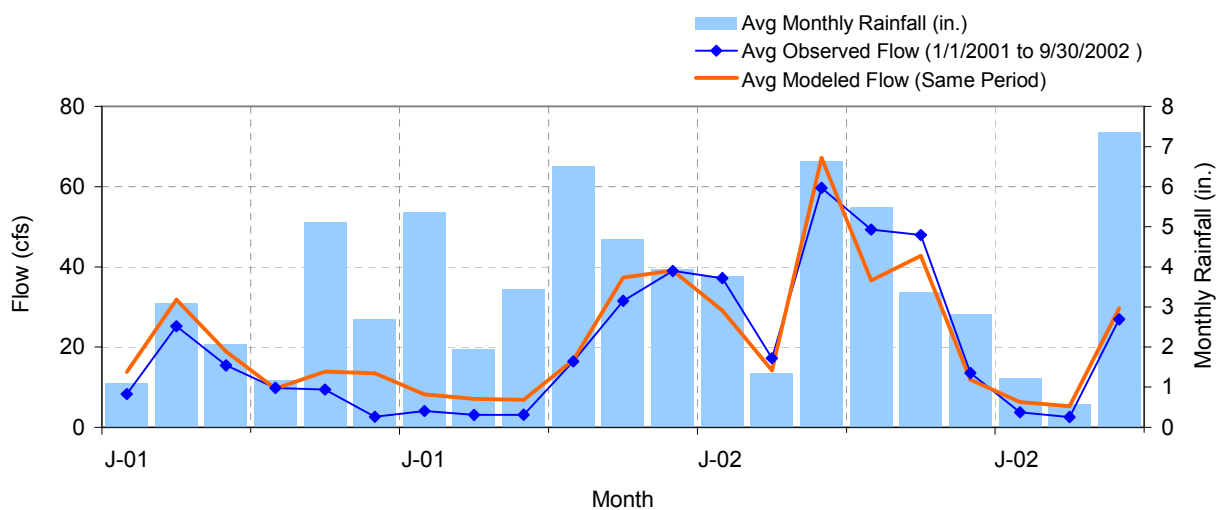


Figure A-45. Mean monthly flow: Model Outlet 134 vs. USGS 03298250 CEDAR CREEK AT THIXTON ROAD NEAR LOUISVILLE, KY

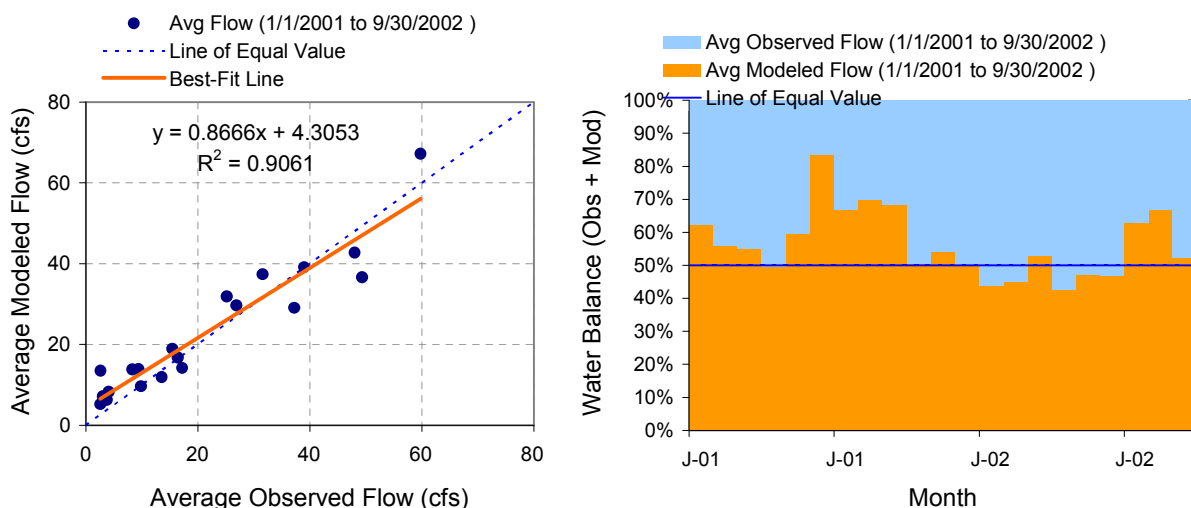


Figure A-46. Monthly flow regression and temporal variation: Model Outlet 134 vs. USGS 03298250 CEDAR CREEK AT THIXTON ROAD NEAR LOUISVILLE, KY

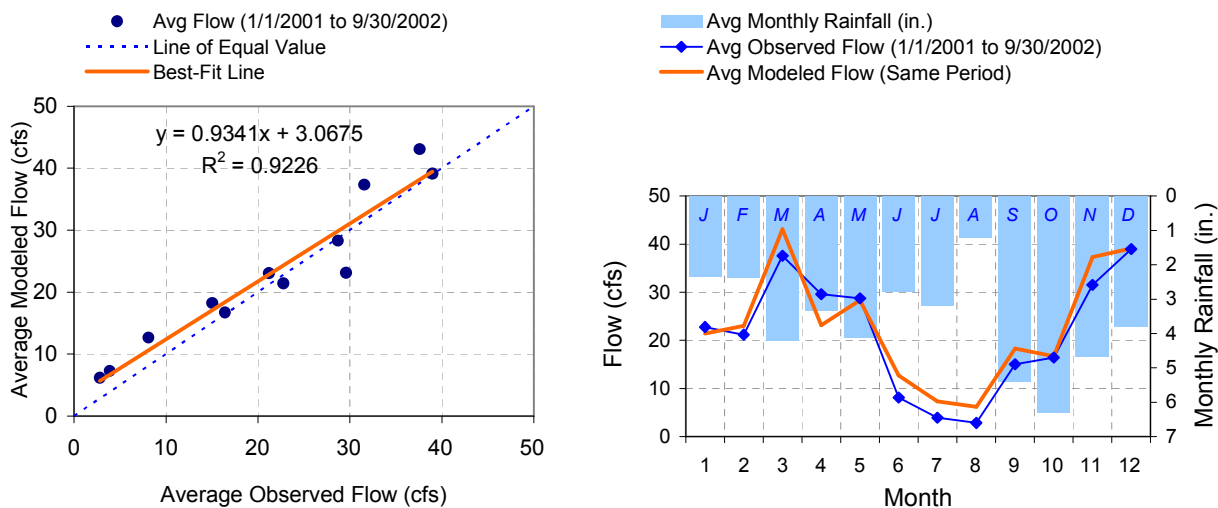


Figure A-47. Seasonal regression and temporal aggregate: Model Outlet 134 vs. USGS 03298250 CEDAR CREEK AT THIXTON ROAD NEAR LOUISVILLE, KY

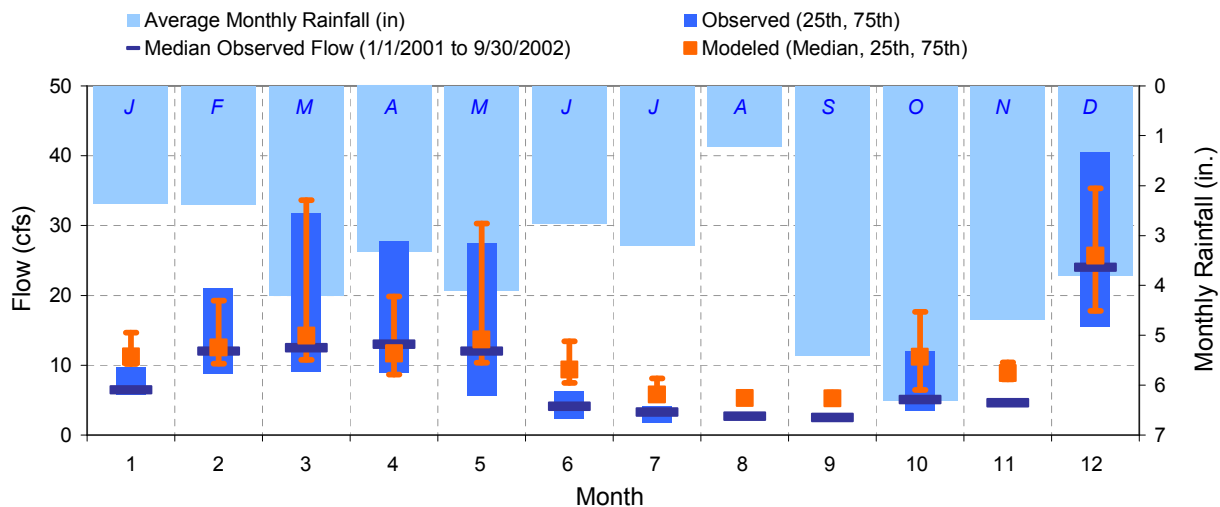


Figure A-48. Seasonal medians and ranges: Model Outlet 134 vs. USGS 03298250 CEDAR CREEK AT THIXTON ROAD NEAR LOUISVILLE, KY

Table A-14. Seasonal summary: Model Outlet 134 vs. USGS 03298250 CEDAR CREEK AT THIXTON ROAD NEAR LOUISVILLE, KY

MONTH	OBSERVED FLOW (CFS)				MODELED FLOW (CFS)			
	MEAN	MEDIAN	25TH	75TH	MEAN	MEDIAN	25TH	75TH
Jan	22.76	6.45	5.73	9.63	21.42	11.23	10.17	14.64
Feb	21.20	12.00	8.85	21.00	23.03	12.53	10.21	19.25
Mar	37.58	12.50	9.00	31.75	43.05	14.23	10.77	33.63
Apr	29.58	13.00	8.93	27.75	23.13	11.70	8.67	19.84
May	28.70	12.00	5.58	27.50	28.30	13.68	10.34	30.28
Jun	8.11	4.10	2.28	6.23	12.68	9.34	7.49	13.40
Jul	3.90	3.30	1.80	4.18	7.29	5.80	5.52	8.09
Aug	2.83	2.70	2.50	2.90	6.16	5.28	5.21	5.53
Sep	15.04	2.50	2.20	3.18	18.25	5.27	5.20	6.07
Oct	16.41	5.10	3.45	12.00	16.74	11.19	6.46	17.64
Nov	31.56	4.60	4.20	5.08	37.34	8.85	7.98	10.38
Dec	38.96	24.00	15.50	40.50	39.14	25.70	17.80	35.31

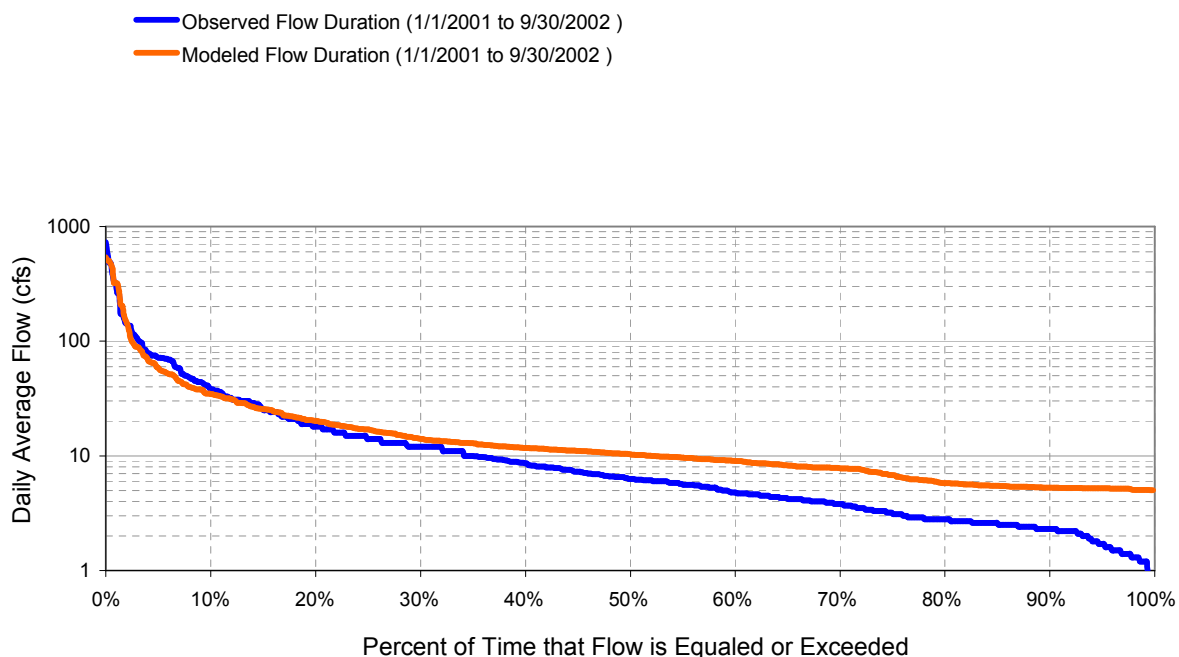


Figure A-49. Flow exceedence: Model Outlet 134 vs. USGS 03298250 CEDAR CREEK AT THIXTON ROAD NEAR LOUISVILLE, KY

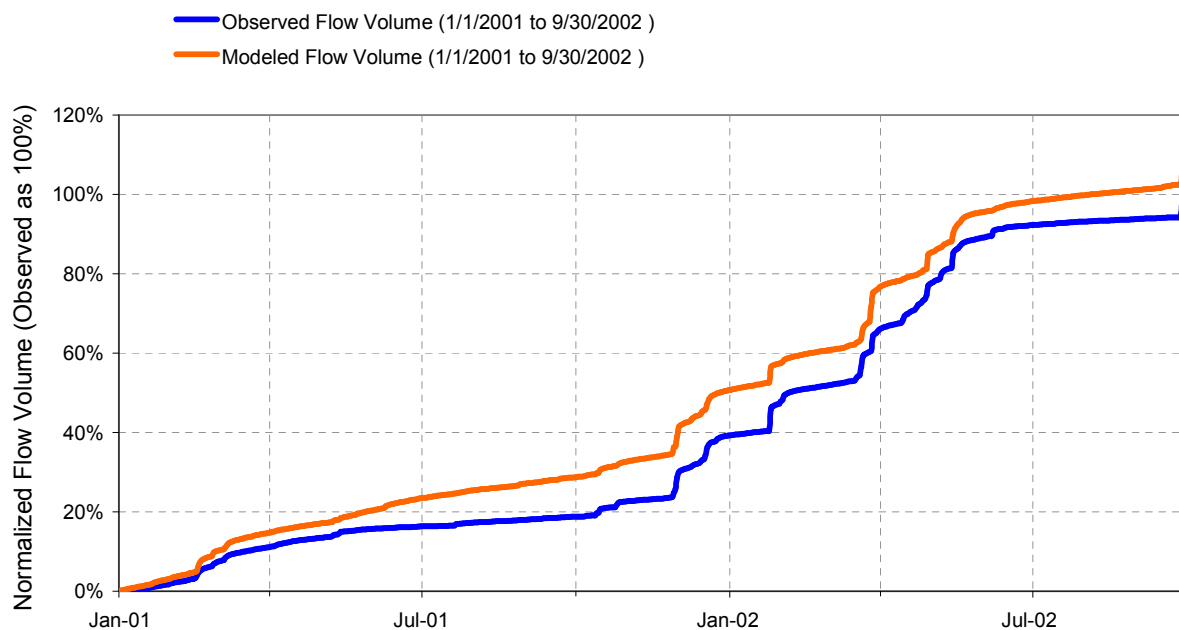


Figure A-50. Flow accumulation: Model Outlet 134 vs. USGS 03298250 CEDAR CREEK AT THIXTON ROAD NEAR LOUISVILLE, KY

Table A-15. Summary statistics: Model Outlet 134 vs. USGS 03298250 CEDAR CREEK AT THIXTON ROAD NEAR LOUISVILLE, KY

LSPC Simulated Flow		Observed Flow Gage	
REACH OUTFLOW FROM SUBBASIN 134 1.75-Year Analysis Period: 1/1/2001 - 9/30/2002 Flow volumes are (inches/year) for upstream drainage area		USGS 03298250 CEDAR CREEK AT THIXTON ROAD NEAR LOUISVILLE, KY Hydrologic Unit Code: 5140102 Latitude: 38.0792321 Longitude: -85.6160683 Drainage Area (sq-mi): 11.1	
Total Simulated In-stream Flow:	26.80	Total Observed In-stream Flow:	24.84
Total of simulated highest 10% flows:	14.32	Total of Observed highest 10% flows:	15.60
Total of Simulated lowest 50% flows:	4.36	Total of Observed Lowest 50% flows:	2.14
Simulated Summer Flow Volume (months 7-9):	3.70	Observed Summer Flow Volume (7-9):	2.53
Simulated Fall Flow Volume (months 10-12):	5.47	Observed Fall Flow Volume (10-12):	5.11
Simulated Winter Flow Volume (months 1-3):	10.14	Observed Winter Flow Volume (1-3):	9.45
Simulated Spring Flow Volume (months 4-6):	7.49	Observed Spring Flow Volume (4-6):	7.75
Total Simulated Storm Volume:	9.04	Total Observed Storm Volume:	10.04
Simulated Summer Storm Volume (7-9):	1.33	Observed Summer Storm Volume (7-9):	1.24
<i>Errors (Simulated-Observed)</i>	<i>Error Statistics</i>	<i>Recommended Criteria</i>	
Error in total volume:	7.87	10	
Error in 50% lowest flows:	103.82	10	
Error in 10% highest flows:	-8.16	15	
Seasonal volume error - Summer:	46.17	30	
Seasonal volume error - Fall:	7.10	30	
Seasonal volume error - Winter:	7.27	30	
Seasonal volume error - Spring:	-3.39	30	
Error in storm volumes:	-9.98	20	
Error in summer storm volumes:	7.08	50	
Nash-Sutcliffe Coefficient of Efficiency, E:	0.707	Model accuracy increases as E or E' approaches 1.0	
Baseline adjusted coefficient (Garlick), E':	0.531		

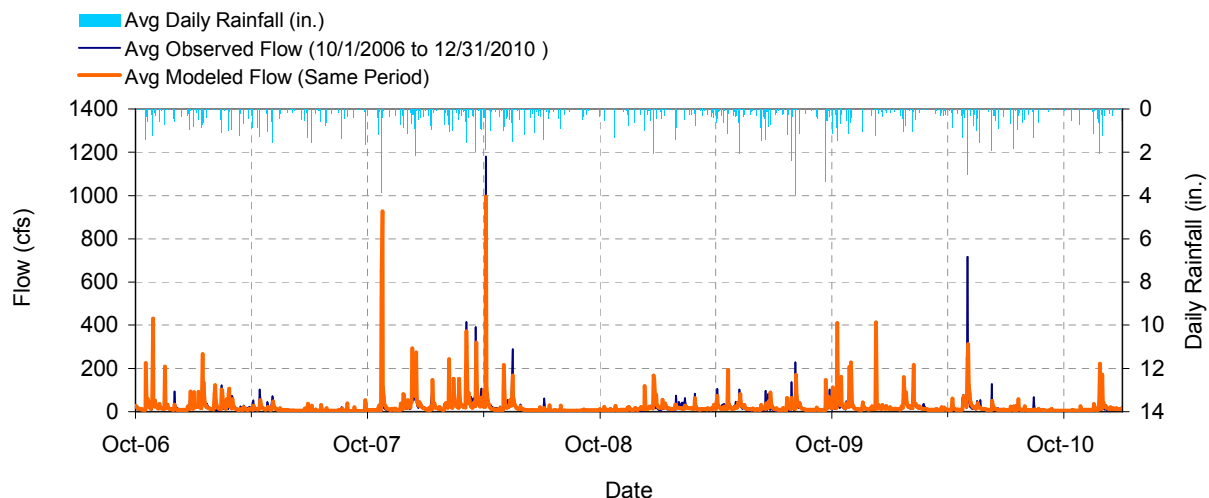


Figure A-51. Mean daily flow: Model Outlet 134 vs. USGS 03298250 CEDAR CREEK AT THIXTON ROAD NEAR LOUISVILLE, KY

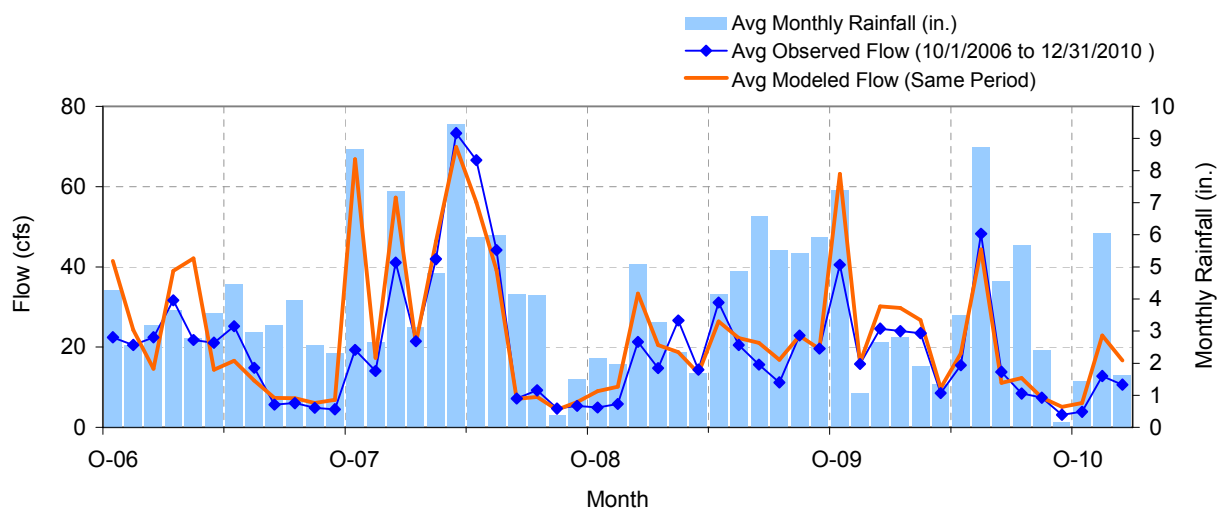


Figure A-52. Mean monthly flow: Model Outlet 134 vs. USGS 03298250 CEDAR CREEK AT THIXTON ROAD NEAR LOUISVILLE, KY

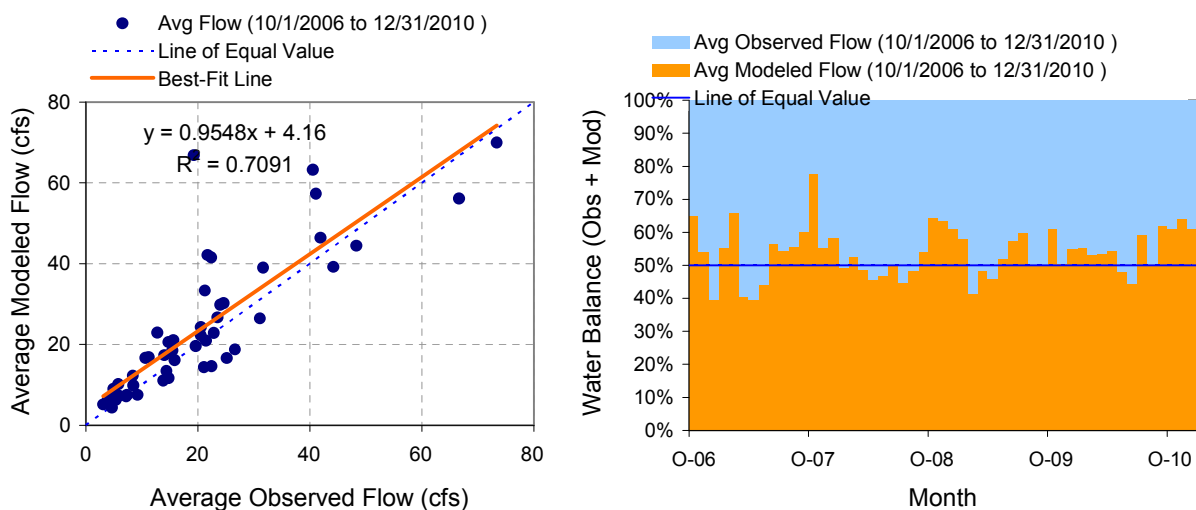


Figure A-53. Monthly flow regression and temporal variation: Model Outlet 134 vs. USGS 03298250 CEDAR CREEK AT THIXTON ROAD NEAR LOUISVILLE, KY

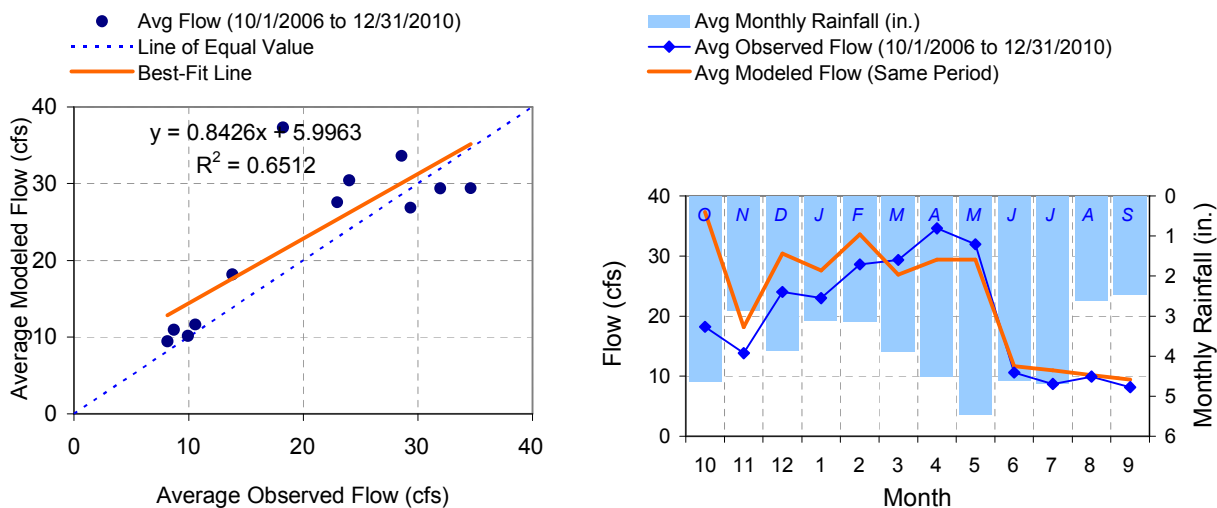


Figure A-54. Seasonal regression and temporal aggregate: Model Outlet 134 vs. USGS 03298250 CEDAR CREEK AT THIXTON ROAD NEAR LOUISVILLE, KY

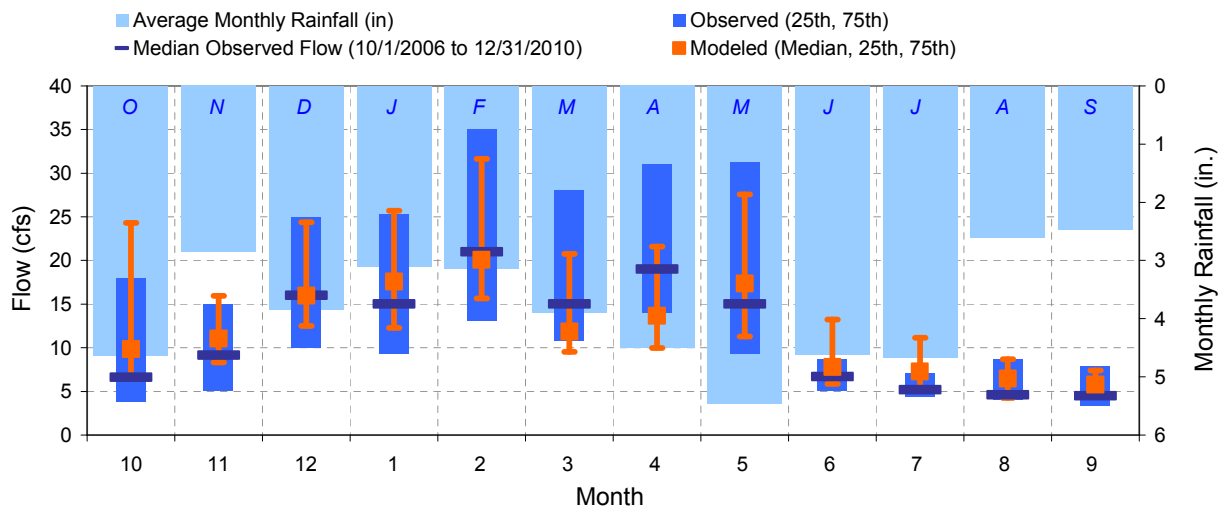


Figure A-55. Seasonal medians and ranges: Model Outlet 134 vs. USGS 03298250 CEDAR CREEK AT THIXTON ROAD NEAR LOUISVILLE, KY

Table A-16. Seasonal summary: Model Outlet 134 vs. USGS 03298250 CEDAR CREEK AT THIXTON ROAD NEAR LOUISVILLE, KY

MONTH	OBSERVED FLOW (CFS)				MODELED FLOW (CFS)			
	MEAN	MEDIAN	25TH	75TH	MEAN	MEDIAN	25TH	75TH
Oct	18.22	6.60	3.80	18.00	37.31	9.84	6.50	24.29
Nov	13.81	9.15	5.10	15.00	18.15	11.05	8.34	15.94
Dec	24.02	16.00	10.00	25.00	30.41	15.97	12.50	24.38
Jan	22.96	15.00	9.28	25.25	27.56	17.57	12.26	25.66
Feb	28.58	21.00	13.00	35.00	33.60	20.06	15.66	31.63
Mar	29.34	15.00	10.75	28.00	26.87	11.85	9.53	20.77
Apr	34.59	19.00	14.00	31.00	29.39	13.66	9.97	21.57
May	31.96	15.00	9.25	31.25	29.38	17.37	11.30	27.56
Jun	10.58	6.70	5.10	8.68	11.64	7.79	5.84	13.22
Jul	8.72	5.20	4.40	7.05	10.97	7.29	5.19	11.15
Aug	9.94	4.60	4.00	8.65	10.17	6.48	4.25	8.68
Sep	8.15	4.50	3.40	7.90	9.45	5.79	4.67	7.41

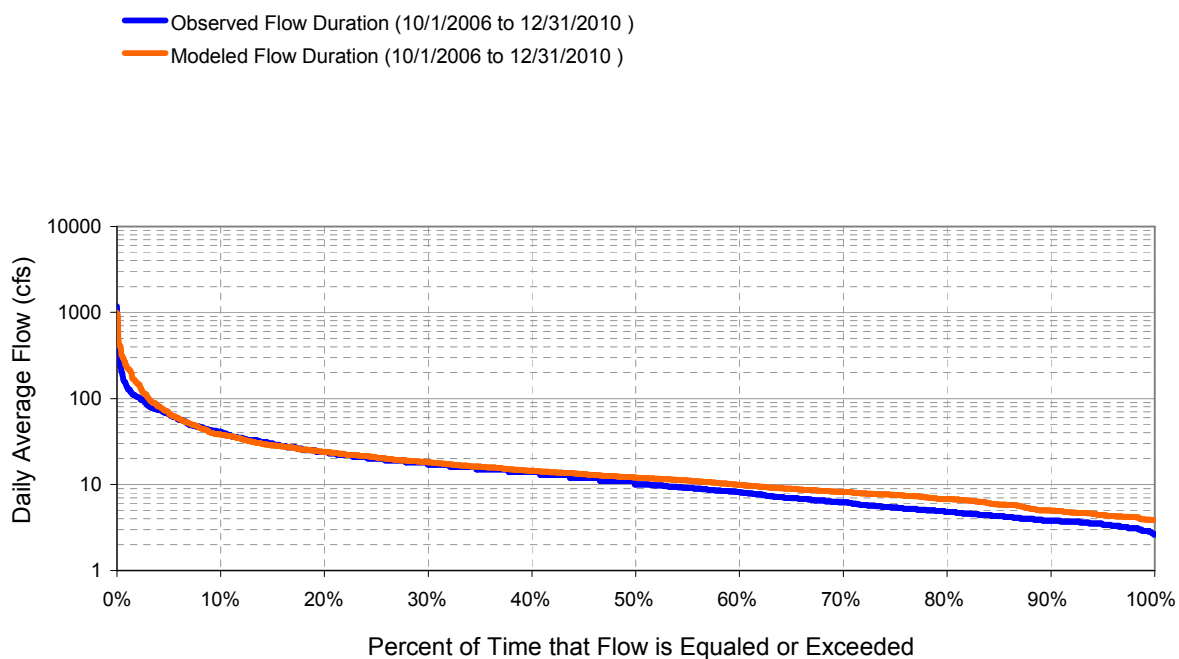


Figure A-56. Flow exceedence: Model Outlet 134 vs. USGS 03298250 CEDAR CREEK AT THIXTON ROAD NEAR LOUISVILLE, KY

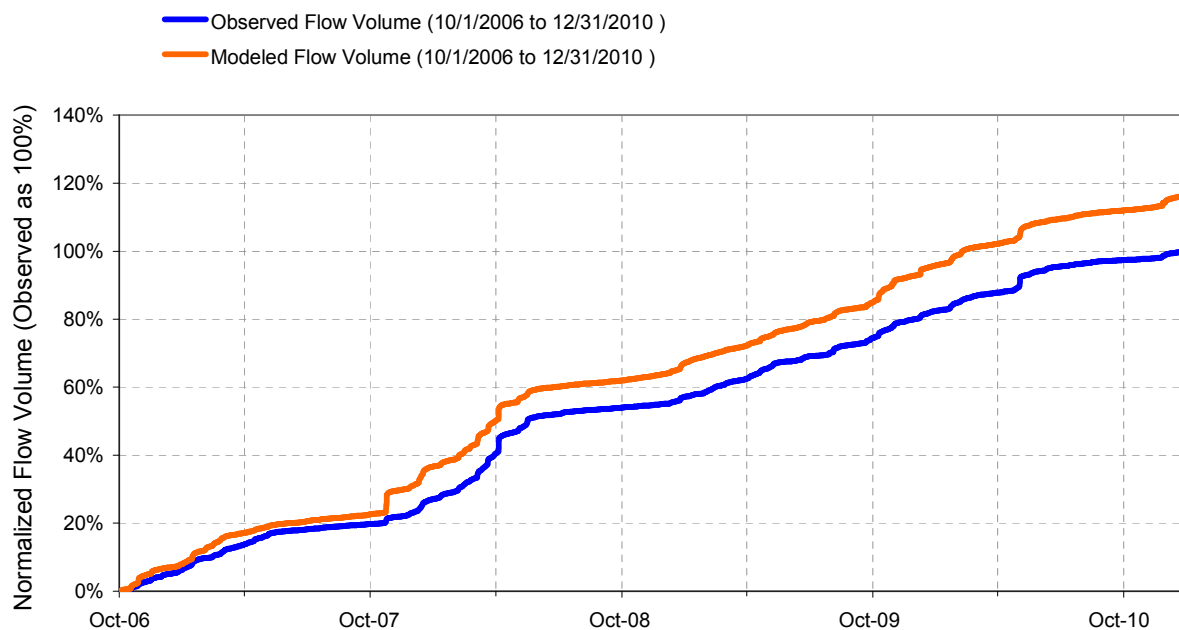


Figure A-57. Flow accumulation: Model Outlet 134 vs. USGS 03298250 CEDAR CREEK AT THIXTON ROAD NEAR LOUISVILLE, KY

Table A-17. Summary statistics: Model Outlet 134 vs. USGS 03298250 CEDAR CREEK AT THIXTON ROAD NEAR LOUISVILLE, KY

LSPC Simulated Flow		Observed Flow Gage	
REACH OUTFLOW FROM SUBBASIN 134 4.25-Year Analysis Period: 10/1/2006 - 12/31/2010 Flow volumes are (inches/year) for upstream drainage area		USGS 03298250 CEDAR CREEK AT THIXTON ROAD NEAR LOUISVILLE, KY Hydrologic Unit Code: 5140102 Latitude: 38.0792321 Longitude: -85.6160683 Drainage Area (sq-mi): 11.1	
Total Simulated In-stream Flow:	28.44	Total Observed In-stream Flow:	24.43
Total of simulated highest 10% flows:	14.08	Total of Observed highest 10% flows:	11.32
Total of Simulated lowest 50% flows:	4.64	Total of Observed Lowest 50% flows:	3.59
Simulated Summer Flow Volume (months 7-9):	2.96	Observed Summer Flow Volume (7-9):	2.59
Simulated Fall Flow Volume (months 10-12):	10.42	Observed Fall Flow Volume (10-12):	6.79
Simulated Winter Flow Volume (months 1-3):	8.31	Observed Winter Flow Volume (1-3):	7.65
Simulated Spring Flow Volume (months 4-6):	6.75	Observed Spring Flow Volume (4-6):	7.39
Total Simulated Storm Volume:	9.20	Total Observed Storm Volume:	7.22
Simulated Summer Storm Volume (7-9):	0.74	Observed Summer Storm Volume (7-9):	0.73
<i>Errors (Simulated-Observed)</i>	<i>Error Statistics</i>	<i>Recommended Criteria</i>	
Error in total volume:	16.39	10	
Error in 50% lowest flows:	29.26	10	
Error in 10% highest flows:	24.32	15	
Seasonal volume error - Summer:	14.10	30	
Seasonal volume error - Fall:	53.40	30	
Seasonal volume error - Winter:	8.56	30	
Seasonal volume error - Spring:	-8.69	30	
Error in storm volumes:	27.56	20	
Error in summer storm volumes:	2.21	50	
Nash-Sutcliffe Coefficient of Efficiency, E:	0.265	Model accuracy increases as E or E' approaches 1.0	
Baseline adjusted coefficient (Garrick), E':	0.322		

Table A-18. Summary: Qualitative and Quantitative scores for the Hydrology Calibration and Validation stations

Location: Main Stem- Floyds Fork			
USGS Gage ID	Station name	Qualitative Score	Quantitative Score
03298200	Floyds Fork near Mt. Washington	VG	80
03297900	Floyds Fork near Peewee Valley	VG	77
03298000	Floyds Fork at Fisherville	VG	77
Location: Tributaries			
03298150	Chenoweth Run at Gelhaus Lane	VG	80
03298300	Pennsylvania Run at Mt. Washington	VG	76
03298135	Chenoweth Run at Ruckriegal Parkway	G	67
03298250	Cedar Creek at Thixton Road	G	67

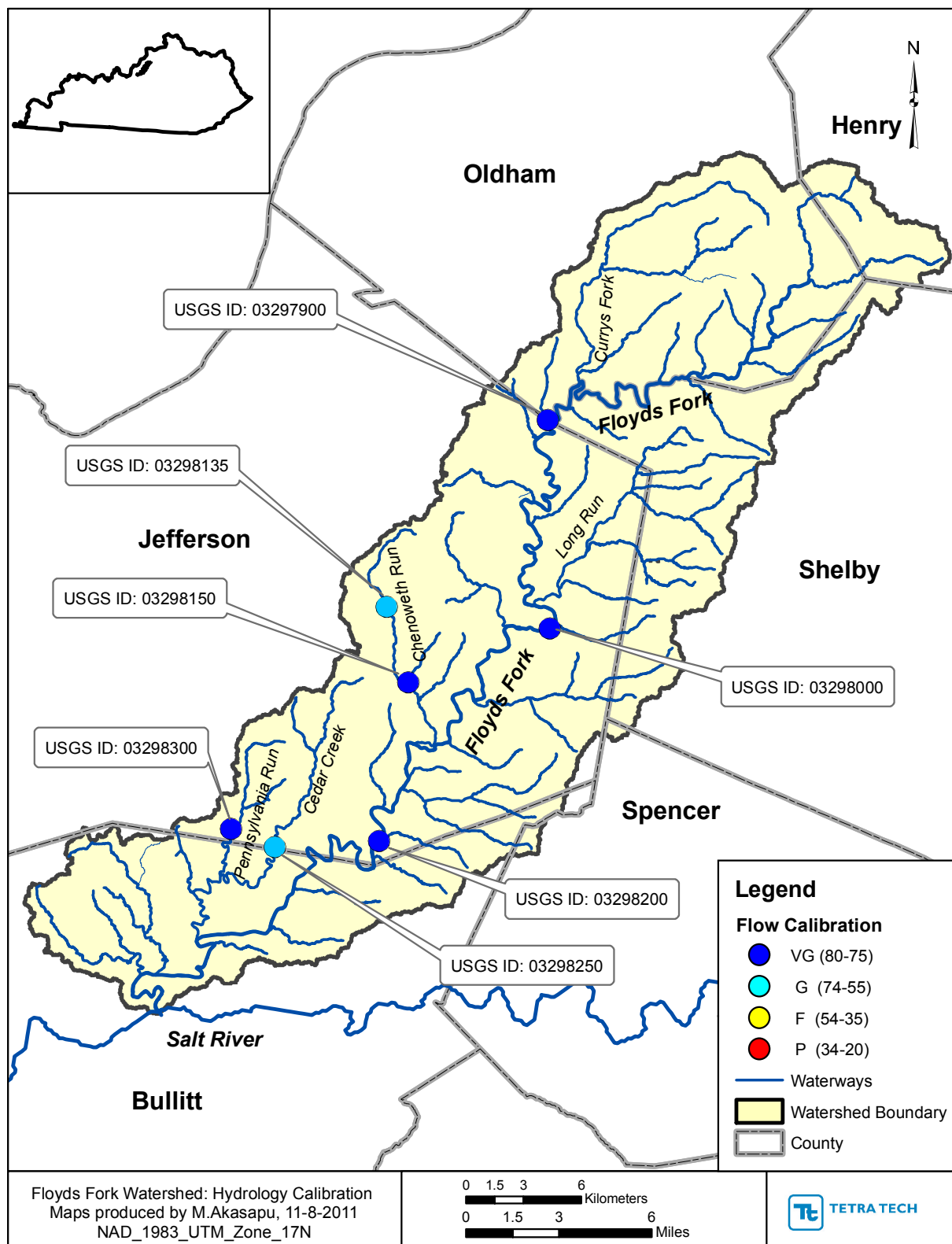


Figure A-58. Qualitative and Quantitative scores for the Hydrology Calibration and Validation stations in the Floyds Fork Watershed model